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THE UNIVERSITY OF ALBERTA

Social Support Buffering of Occupational Stress Among Female Postal Workers

by

© Kathleen Morrow

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF Master of Arts

Sociology

EDMONTON, ALBERTA

Spring, 1988

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.....

Supervisor

.....

.....

Date....March 7, 1988.....

In fond memory of my dear

friend and mother

MARY

Abstract

The stress buffering hypothesis proposes that a individuals' social support resources may act to buffer or reduce the adverse effects of stress on health. This study focused on the ability of social support to buffer occupational stress among female postal workers (n=463) in the Edmonton area. Both the ability of social support to moderate the relationship between objective work conditions and perceptions of occupational stress and the ability of social support to moderate the relationship between perceived occupational stress and depression were tested. Perceived role conflict and lack of variety, as well as two global indicators were used as separate measures of perceived occupational stress. The moderating role of five different sources of social support (perceived support from supervisor, coworker, spouse, friend, and relative) was examined. Overall, the results provided little support for the buffering hypotheses tested. Only one consistent, albeit small, buffering effect was observed; spouse support was found to consistently buffer the relationship between perceived stress and depression. Weaknesses in research methods, particularly with respect to the cross-sectional survey design and the measurement of the social support variable were identified as possible explanations for the failure of the study to detect stress buffering effects. Directions for future research were suggested.

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I. INTRODUCTION

The subject of stress has received considerable research attention across a number of disciplines in the last few decades. Hinkle (1987:561) reports that the 1985 edition of the Cumulated Index Medicus lists more than 1,100 scientific articles relating to 'stress' or 'stress effects' in biological and social systems. Despite this burgeoning research effort, much remains to be known about the dynamics of human stress. Among social scientists stress is generally conceptualized as a process which encompasses three theoretically distinct domains: the sources of stress, the mediators of stress, and the manifestations of stress (Pearlin et al., 1981:337). Research has established a small, but significant link, between various sources of stress and a variety of adverse health outcomes such as peptic ulcers, cardiovascular disease, high blood pressure, and depression (Schuler, 1980:185). Increasing attention is now being focused on the 'factors' or 'resources' which may act to attenuate or reduce the negative health effects of stress. Some investigators have identified social support as one resource which may act to buffer the impact of stress on physical and psychological health. (e.g., Turner, 1981; House, 1981; Cohen and Wills, 1985; Kessler and Mcleod, 1985). The proposal that an individual's social support resources may act to reduce the adverse effects of stressful events or conditions on his/her health status has been termed the buffering hypothesis.

The buffering hypothesis is based on the intuitively reasonable idea that social support may provide resources which serve to buffer the individual in the face of adversity. The proposition that social support plays a role in the maintenance of health does not reflect a new idea (Turner, 1981:357; Thoits, 1983:174; Lazarus and Folkman, 1984:243). The concepts of social interaction and social bonds, for example, have been fundamental components of social and pschological theory for many years (For a review, see Alloway and Bebbington, 1987). Although on a theoretical level the importance of social resources has long been recognized, it has been only recently that empirical evidence on the subject has been systematically collected.

The empirical evidence which bears on the buffering hypothesis has been mixed. Cohen and Wills (1985) argue that these mixed results can be attributed to weaknesses in methodology. These reseachers argue that studies which exhibit adequate methodological and statistical criteria and which use appropriate measures of social support have provided consistent evidence in favor of the buffering hypothesis. Similarly, Kessler and McLeod (1985:22) argue that almost all of the inconsistent results among the community studies they reviewed could be "traced to weaknesses in conceptualization, measurement, sample size, or analysis method." These investigators conclude that when these weaknesses in study design are taken into account the evidence strongly supports the buffering hypothesis.

Most of the research that has tested the buffering hypothesis has looked at the role of social support in moderating the relationship between life events and various health outcomes. Comparatively scant attention has been paid to the intervention of social support in the occupational stress process. Only a handful of studies have tested the stress buffering hypothesis in an occupational setting (House and Wells, 1978; LaRocco et al., 1980; Wells, 1982; Karasek et al., 1982; Winnubust et al., 1982; Ganster et al., 1986; Kaufmann and Beehr, 1986). Occupational stress is considered conceptually different from the life events stress studied in community samples in that life events stress generally reflects 'crisis' events occurring in the respondents' recent past while occupational stress, by comparison, focuses on the respondents day to day chronic role stress (Kessler, 1983:268).

Very little is known concerning the ability of social support to moderate daily occupational stresses. Theoretically, social support could intervene at two points in the occupational stress process. First, social support may reduce the likelihood that workers will perceive adverse work conditions as stressful. Second, social support may reduce the detrimental effects of perceived occupational stress on health.

Occupational studies on the buffering hypothesis have focused on the ability of social support to attenuate or weaken the relationship between perceived stress and adverse

health outcomes. Only one study, by Wells (1982), has considered the ability of social support to buffer the effect of objective job conditions on perceptions of occupational stress. As a result, much remains to be known concerning how social support affects the translation of work conditions into individual perceptions of stress. Moreover, occupational studies have been almost exclusively confined to samples of male workers. Very little is known concerning the stress buffering process among female workers.

The present investigation proposes to test the stress buffering role of social support using cross-sectional data on female postal workers. Two basic research questions will be considered. First, does social support act to reduce the effect of adverse work conditions on the perception of stress? Second, does social support reduce the effect of perceived stress on the psychological health of workers? These basic reseach questions will be further refined to explore the more subtle theoretical issues concerning which sources of support exhibit buffering effects for which occupational stressors.

This study, to some extent, will perpetuate the same weaknesses inherent in previous investigations. Most important, this study, like previous research, is based on cross-sectional survey data. This will limit the ability of the study to capture the dynamics of social support intervention in the stress process. Cross-sectional data

also are particularly vulnerable to the criticism that key variables of interest reflect common method variance and a response consistency set (Depner et al., 1984:42). Beyond these considerations, the present study can be viewed to build upon past studies in at least two important respects. First, the study is based on a sample of female workers. Previous studies have been restricted to male or primarily male samples. Consequently, very little is known about stress buffering among females workers. Second, the study focuses on the role of social support in buffering the effects of objective job conditions on perceptions of stress. Only one other study testing the buffering hypothesis has attended to the importance of objective work conditions in the occupational stress process (Wells, 1982).

This investigation will be organized into three chapters. Chapter Two will outline a theoretical framework for the buffering hypothesis along with a review of the empirical evidence and related methodological issues bearing on the hypothesis. The final section in Chapter Two will provide a statement of the research problem. Chapter Three will elaborate the stress buffering hypotheses to be tested. An outline and critique of the study design, variable measurement, and data analysis procedures will also be given. Chapter Four will present the tests of the stress buffering hypotheses and highlight the major findings. Finally, the concluding chapter, Chapter Five, will provide a general summary and interpretation of the results.

Directions for future research will also be suggested.

II. LITERATURE REVIEW AND RESEARCH PROBLEM

A. INTRODUCTION

The idea that social support may intervene in the stress process presents some theoretical appeal and has captured the attention of a growing number of researchers. Chapter Two will provide a theoretical framework which delineates the intervention of social support in the stress process. This theoretical framework will then be evaluated in light of previous empirical investigations. The final section will provide a description of the research problem that will be investigated in this thesis.

B. THEORETICAL FRAMEWORK

The entire field of stress research is beset by conceptual ambiguity. Hinkle (1987:561), for example, notes that "there is still today no generally agreed upon definition of 'stress' that allows anyone to determine unequivocally when the state exists and to categorize it as present or absent..." Certainly, the search for an 'objective' cause of stress has failed. Stimulus definitions of stress that rely on the assumption that there are certain circumstances or conditions which can be considered inherently stressful fail to account for the observation that exposure to a 'noxious' environment does not necessarily lead to a stress response in everyone. Moreover, stimulus definitions of stress suffer from a theoretical

circularity in that stimulus definitions beg the question of what it is about the stimulus that produces a particular stress response and what it is about the response that indicates a particular stressor (Kimball, 1982:66).

Social researchers have for the most part rejected stimulus theories of stress and have opted for a model which recognizes the importance of the interaction between the environment and the individual. Lazarus and Folkman (1984:17) argue that "a person does not become ill merely due to exposure to a noxious agent in the environment, but becomes ill as a result of being vulnerable to those agents." Similarly, Hinkle (1987:561) proposes that "the relation of an organism to its environment is, in large measure, a communicative interaction...Its response to its integrity is based on the evaluation of information received."

In the occupational literature, stress has also been conceptualized as a function of the interaction between the individual and the environment. House and Wells (1978) argue that the perception of stress depends upon the dynamic interplay between situational and individual factors. Specifically, it has been proposed that workers will perceive stress when the environmental demands on them exceed their abilities to meet those demands, or when the work environment is unable to fulfill strong individual needs or wants. In this context, occupational stress can be viewed as a disparity between environmental demands and

individual abilities and/or a disparity between individual wants or needs and occupational opportunities (Van Harrison, 1985:24).

This conceptualization of stress has been incorporated into a model of occupational stress at the University of Michigan. According to this model, occupational stress can be concepualized as a causal chain which links in sequence, (1) the objective environment, (2) perceived stress, (3) short-term responses (physiological, behavioral, psychological), and (4) health and disease outcomes (Kasl and Wells, 1985:180). The model is interactionist because the perception of stress depends upon the relationship of individual abilities and needs to a given work environment (Winnubst et al., 1982:475). Although stress is viewed to be ultimately in the eye of the beholder, on a normative level it is recognized that some work situations present a greater potential for stress in the sense that some work conditions more than others heavily tax the abilities of the worker and/or in the sense that some work conditions more than others supply few opportunities for worker gratification (Lazarus, 1981; House and Wells, 1978). Thus, conventional practice employs the term stressor to refer to "an objective situation that has the potential to provoke psychological reactions in the individuals who find themselves in this situation" (Kessler, 1983:268). In the occupational stress model presented here the features of the objective work environment can be referred to as 'stressors'. Stress

reactions to the objective work environment include both the perception of stress and adverse health outcomes.

The Michigan occupational stress model proposes that perceived stress can result in a variety of psychological, behavioral, and physiological responses. Once a situation is perceived as stressful, the individual may try to manage or cope with the perceived stress by modifying the objective conditions which lead to the stress and/or by modifying his/her intial perception of those conditions (House, 1981:38). Perceived stress may result in a number of short-term health consequences. Psychological stress reactions may include job dissatisfaction, anxiety, and lowered self-esteem (LaRocco et al., 1980:208). Behavioral responses to perceived stress may include increased smoking or absenteeism. Physiological responses may involve high blood pressure and elevated serum cholesterol levels (Van Harrison, 1985:26). Chronic perceived stress may over time lead to a variety of severe clinical illnesses such as chronic clinical depression, heart disease, and peptic ulcer (Van Harrison, 1985:26; Winnubst et al., 1982:475).

The buffering hypothesis proposes that the intervention of social support in the stress process mitigates the effect of stress on health outcomes. Theoretically, there are at least two different points in the stress process linking environmental stressors to health outcomes where social support could intervene (House, 1981; Cohen and Wills, 1985). First, social support could reduce the impact of

objective work conditions on perceived stress. That is, individuals might be less likely to perceive a particular work environment as stressful if they believe that they can rely on others to provide the aid necessary to meet the demands of the work situation. Social support would, in this case, act to diffuse potentially stressful environmental conditions. Wells (1982:93) for example, suggests that "social support may operate by establishing an appraisal context within which potentially threatening environments are perceived more benignly." Along a similiar line, Segovis and his colleagues (1985:221) argue that "one's peers and socially significant others provide sources of information on how to label a situation in order to reduce uncertainty. They provide an interpretation of what the event means and how one should respond to it." In this manner, social support may provide important interpretive cues which serve ultimately to buffer the effect of the potential occupational stressors on perceptions of stress.

A second point in the stress process where social support could intervene is between the perception of stress and health outcomes. An individual's social support resources may act to inhibit the effects of perceived stress on health outcomes. House (1981:38) and Cohen and Wills (1985:312) suggest a number of different ways social support could intervene at this point in the stress process. Social support could mitigate the impact of stress simply by providing a solution to the problem. Social support,

particularly from one's spouse or family, may help the worker evaluate the importance of the perceived stress within a broader life context. In this way, social support may help to reduce the importance or priority attached to the perceived stress. Social support may also encourage constructive coping behaviors (such as exercise, personal hygiene, proper nutrition, and relaxation) which strengthen resistance to disease or illness. Finally, it has been suggested that social support may have some degree of "tranquilizing effect on the neuroendocrine system", making individuals less susceptible to the detrimental health effects of stress (House, 1981:38).

The discussion has so far focused on the points in the stress process where social support may intervene. Very little attention has been paid to what is meant by the concept of social support. One of the major problems in research on stress buffering effects lies in the lack of theoretical clarity surrounding the concept of social support (Thoits, 1982; Depner et al., 1984; Veiel, 1985; Cohen and Wills, 1985; Alloway and Bebbington, 1987). Many investigators have not attempted to formulate a precise conceptual definition of social support in their research (Thoits, 1985:146). Moreover, many of the definitions of social support that have been attempted are circular. For example, such definitions of social support as "support accessible to an individual through social ties", or "the degree of access to support resources", or "help helpers

extent" beg the issue concerning the qualities or dimensions that define social support (Veiel, 1985:157).

There appears to be some consensus among researchers that social support is a multidimensional concept (House, 1981; Veiel, 1985; Thoits, 1982; Cohen and Wills, 1985). Thoits (1982) argues that the amount of support, the type of support (e.g., socio-emotional and instrumental), and the sources of support (e.g., spouse, friends, family, co-workers) are all important dimensions. House (1981:39) conceptualizes social support as an interpersonal transaction involving one or more of the following functions: "(1) emotional concern (liking, love, empathy), (2) instrumental aid (goods or services), (3) information (about the environment), or (4) appraisal (information relevant to self-evaluation)." Cohen and Wills (1985:313) offer a similiar functional typology. According to their conceptualization, social resources may provide esteem support, informational support, social companionship, and instrumental support. Any one or all of these support functions could be offered by a support resource.

Some researchers have suggested that social support would be more likely to act as a stress buffer when it matches the specific needs elicited by the stressor (Wills, 1985; Cohen and Wills, 1985; LaRocco et al., 1980). The matching model presented by Wills (1985:77) proposes that "buffering effects depend on the relationship between the specific needs evoked by a particular stressor and the

functions provided by an available supporter." Specific sources of support might be more able to meet the support functions needed or elicited by particular stressors. Support from a co-worker or a supervisor might better match the needs elicited at the workplace than sources of support from outside the workplace (e.g., family and friends). This implies that specific work-related stressors would be more effectively buffered by work-related sources of support (LaRocco et al.,1980:214). There is an alternative possiblity. Wells (1982:82) argues that sources of support outside the workplace may provide an important cognitive context in which experiences at work are appraised: "insofar as social support indexes some interpersonal milieu that at least partially determines cognitive appraisal... [one would] expect that non-work sources of support may be equally important in buffering stress." Similarly, House and Wells (1978) propose that spouse support, by emphasizing a broader life context for the worker, may help the worker evaluate and reduce his perceived work stress.

It is likely, at least to some extent, that both work and nonwork sources of support are able to provide some of the functions (e.g., esteem support, informational support, social companionship, and/or instrumental support) needed to reduce the effects of occupational stress. Cohen and Wills (1985:314) predict that esteem and informational support are likely to be pervasive stress buffers because they are likely to match a wide range of stress events. Thus, to the

extent that both work and nonwork sources of support are able to provide esteem support when needed, both work and nonwork sources of support would be predicted to be effective occupational stress buffers. Cohen and Wills (1985:314) also argue that instrumental support will be effective only when it closely matches the needs elicited by the stress. With respect to occupational stress, co-workers and supervisors would appear to be the most likely candidates in the provision of instrumental aid and hence, in this circumstance, would be predicted to be the most effective stress buffers. In sum, whether or not work or nonwork sources of support operate as effective occupational stress buffers can be posited to depend upon the match between the support function offered and the needs elicited by the occupational stress. Both work and nonwork sources appear to be able to provide the supportive functions relevant to the needs elicited by occupational stress.

A model depicting the intervention of social support in the occupational stress process needs to be elaborated. The research literature has provided two different models, an interactive buffering model and an additive buffering model, to conceptualize the intervention of social support in the stress process. The interactive buffering model has been the model most often recognized in the literature (For a review, see Cohen and Wills, 1985). The interactive model proposes that stressor and social support interact in such a manner that those individuals who have higher levels of social

support will be buffered from adverse health effects, while those individuals who have lower levels of support will suffer from the full adverse impact of stress. In this model, the effect of support on health and the effect of stress on health are considered joint effects; the effect of stress on health is dependent on, or is conditional upon, the level of social support. The interactive model differs fundamentally from the additive model in that it does not specify any link between the level of stress and the level of social support. The essential feature of the additive model is that support is dependent upon the level of stress (Wheaton, 1985:355). The additive stress buffering model proposes that increasing stress levels act to increase the mobilization of social support resources which, in turn, act to decrease the direct impact of stressors on health. Wheaton (1985) refers to social support in the additive model as a 'suppressor' variable because the indirect effect of stress through social support on health suppresses the direct effect of stress on health. The overall total effect of stress on health is thus reduced because of the indirect suppressing effect of social support.

The interactive buffering model could apply both to the relationship between objective work conditions and perceived stress and to the relationship between perceived stress and health outcomes. That is, social support may interact with objective work conditions in affecting perceptions of stress and social support may interact with perceived stress in

affecting health outcomes. It is important to emphasize that the interactive model does not specify a relationship between stress and social support. In this respect, the interactive model refers to those support resources that provide relatively stable support functions which operate independently of stress levels. One can imagine many support functions unrelated to stress levels. For example, a spouse or a friend may provide esteem support regardless of whether one is experiencing perceived stress or not. Similarly, friends or relatives may participate in social or recreational activities regardless of an individual's perceived stress levels. These relatively stable support functions may serve to buffer both the effects of the adverse job conditions on perceptions of stress and the effects of perceived stress on health.

The additive stress buffering model would appear to apply only to the relationship between perceived stress and health. The additive stress buffering model proposes that individuals who perceive stress mobilize their support resources which, in turn, mitigate the overall effect of perceived stress on health. One can consider many circumstances where the additive stress buffering model would apply. A worker, who perceives occupational stress may mobilize any number of support resources. For example, the worker who perceives stress could seek out the advice of his/her supervisor and/or the worker could seek out task-related aid from co-workers. In both of these instances

the perceived stress leads to the mobilization of a support resource which in turn decreases distress.

In summary, the intervention of social support in the stress process can be conceptualized in a number of different ways. The basic model of occupational stress proposes that occupational stressors lead to perceptions of stress which, in turn, may lead to both short-term and long-term health consequences. There are at least two points in the stress process where social support may intervene. Social support could intervene in the relationship between occupational stressors and perceived stress. At this point, interactive stress-buffering applies. The interactive buffering model proposes that those workers who have high levels of support resources will be less likely to perceive stress than those workers with low levels of support resources. Social support, either from work or nonwork sources, may provide contextual information and/or esteem support making it less likely that a worker will label a given work situation as threatening and hence, making it less likely that the worker will perceive occupational stress.

The second point in the stress process where social support could intervene is between the perception of stress and health outcomes. Here, either the interactive or the additive stress buffering model could apply. In the interactive model, appraisal, informational, esteem, and/or instrumental support from work and/or nonwork sources could

function to buffer the adverse health consequences of perceived stress. The interactive model proposes that social support interacts with perceived stress such that those workers who have high levels of support resources will be less likely to suffer the effects of perceived stress than those workers who have low levels of support resources. The additive stress buffering model argues that perceived stress leads to the mobilization of support (appraisal, informational, esteem, and/or instrumental) which, in turn, suppresses the overall impact of the perceived stress on health outcomes. Thus, both the interactive and additive stress buffering models may operate to reduce the effects of perceived stress on health.

C. EMPIRICAL EVIDENCE FOR THE BUFFERING HYPOTHESIS

There is only one study that has examined the role of social support in moderating the relationship between objective occupational stressors and perceived stress. Wells (1982) tested the hypothesis that social support mitigates the impact of objective job conditions on the perception of stress on a sample of 1,809 blue collar male factory workers. Wells examined the stress buffering abilities of four sources of support; supervisor, spouse, co-worker, and friends and relatives. Objective job conditions were measured by 'expert raters' with respect to objective rewards, interpersonal demands, and both quantitative and qualitative workload. Corresponding perceived stress

measures were developed for each of the four objective work conditions. The study found that "over half of all the relationships between job conditions and perceived stress were conditioned by one or more sources of support, the prevalent conditioners being friend and relative support and supervisor support" (Wells, 1982:93). Objective rewards and quantitative workload were the two occupational stressors most consistently buffered by social support. The study reported that no conclusion could be made regarding which sources of support (work versus nonwork) provided the most effective stress buffering.

Research in the occupational literature on stress buffering effects has focused almost entirely on the interactive stress buffering hypothesis and on the relationship between perceived stress and health outcomes. House and Wells (1978) tested the interactive buffering effects of social support on the perceived stress-health relationship among male factory workers (the same sample used by Wells, 1982). House and Wells reported that 15 per cent (21 out of 140) of the equations testing for stress buffering effects lent significant support ($p<.10$) to the hypothesis. Supervisor and spouse support proved to be the most prevalent stress buffers. The effects of co-worker support appeared to be inconsequential in this study. LaRocco and his colleagues (1980) tested the interactive stress buffering model on a random sample of males from 23 different occupations. These researchers found that social

support buffered the relationship between job stress and health in 35 per cent of the equations tested. In contrast to the House and Wells (1978) study, co-worker support was found to have a more pervasive buffering effect than supervisor or home support, especially in buffering workers against the impact of perceived stress on depression and somatic complaints.

House (1981) has suggested that the working environment may determine which sources of support are the most salient and hence may explain why some sources of support act or do not act to buffer occupational stress. For example, specific occupational settings and task orientations which limit the opportunity for co-worker interaction would affect the extent to which co-workers could be utilized as a support resource. This is illustrated in the House and Wells (1978) study where the occupational setting was not conducive to co-worker interaction and where co-worker support showed few significant buffering effects.

Karasek and his colleagues (1982) examined the moderating role of social support on a random sample of the U.S. work force. This study confined its analysis to male workers only and like the previous studies, tested the interactive stress buffering hypothesis. Out of 35 tests for buffering effects 18 or 51 per cent were found to be significant ($p<.05$). Both co-worker and supervisor support were involved in moderating the relationship between perceived task stress and measures of psychological

distress. Winnubst et al. (1982) tested the interactive buffering hypothesis on a predominantly male sample of industrial workers from the Netherlands. This study found that co-worker and supervisor support buffered the relationship between perceived stress and psychological/behavioral strain in 25 per cent (15 out of 60) of the equations tested. Social support was not found to buffer the relationship between perceived stress and physical health outcomes. Winnubst and his colleagues concluded that there was a clear specificity in the buffering effects of social support. Role overload and role conflict were the two job stressors most consistently buffered by social support while role ambiguity and future uncertainty showed little involvement in stress buffering.

A more recent study by Etzion (1984) compared the interactive stress buffering effects of social support between male and female workers in a non-random sample of managers and social service professionals. This research found that the relationship between work stress and psychological/somatic complaints was moderated by support resources outside of work for women (spouse, family, and friends) and by support resources at work for men (supervisor, co-workers, and subordinates).

Some occupational studies have not found any evidence supporting the interactive buffering hypothesis. A study by Ganster and his colleagues (1986) found a few significant interactions between perceived stress and social support,

but no more than would be expected by chance. Interestingly, the significant interactions that were found, were in the opposite direction to that predicted by the buffering hypothesis. It should also be noted that LaRocco et al. (1980), Karasek et al. (1982) and Winnubst et al. (1982) reported a few instances of reverse buffering interactions, although again, no more than would be expected by chance.

A study by Kaufman and Beehr (1986) on a non-random sample of nurses reported more instances of reverse buffering than would be expected by chance. The majority of significant interactions in this study indicated that social support made the relationships between stress measures and health outcomes significantly stronger, not weaker. An explanation for this anomaly has not yet been developed. It may be that some interactions between workers and their support sources serve to exacerbate, not reduce, stress. For example, communication between co-workers may convince a stressed worker either that a situation is not as bad it seems or that the situation is, indeed, terrible (Kaufmann and Beehr, 1986:524). It may also be that support from one's supervisor may be difficult to deliver in non-threatening ways (Kasl and Wells, 1985:184).

Overall, the studies reviewed here lend some support to the hypothesis that social support buffers the effects of occupational stress. The findings vary with respect to which sources of support act to buffer stress and with respect to which health outcomes are buffered by social support. It is

important to acknowledge that the evidence for the buffering hypothesis has not been overwhelming. Most of the studies reviewed here have used a large number of tests to examine the stress buffering hypothesis. With the exception of the Karasek et al.(1982) study, no more than 35 per cent of these tests reached significance within any given study. Moreover, the size of effect when it has been reported, has not been very substantial. In their review of the occupational literature, Kasl and Wells (1985:183) report that the significant social support and perceived stress interaction term accounts for predominantly less than one per cent of the variance in health outcome measures.

It may be the case that the role of social support in the occupational stress process has been underestimated due to weaknesses in measurement and methodology. All of the studies reviewed here have used a cross-sectional survey design which is inherently inadequate to investigate a dynamic stress process. Kasl and Wells (1985:184) note that cross-sectional data may "only hint at the remnant of adaptional dynamics, much attenuated by the passage of time and unmeasured selective attrition." Thus, the timing of measurement in the cross-sectional design may obscure real conditioning effects.

Other problems lie in weaknesses in the measurement of key variables. Brief and Atieh (1987:122) suggest that researchers need to pay attention to the relationship between objective and perceptual measures of job conditions.

Related to this is the need to examine how workers themselves label the conditions of their work. It may be that perceived work conditions such as role ambiguity or role conflict that are presumed by many researchers to be stressful may not be labelled as such by the workers themselves (Payne et al. 1982:135).

Another concern is that the measurement of perceived work conditions and distress outcomes often used appear to have some degree of operational overlap (Brief and Atieh, 1987:122). Some investigators have argued that the measurement of perceived job conditions and distress outcomes may to some extent reflect not their supposed theoretical constructs, but rather, an underlying personality disposition to view one's self, others, and the world in negative terms (Brief and Atieh, 1987:122; House et al., 1979:150; Depner et al., 1984:42). An adequate test of the buffering hypothesis requires the use of valid measures of occupational stress.

In summary, there is some evidence which supports the interactive buffering hypothesis. It needs to be recognized, however, that the evidence has been generally modest and has shown relatively weak buffering effect sizes. These results should be considered within the overall research framework which suffers from methodological and measurement weaknesses. In particular, the weaknesses in measurement, especially in the measurement of the perceived stress variable, the lack of attention paid to objective work

conditions, and the reliance solely on cross-sectional data reduces the adequacy of tests for stress buffering effects.

D. RESEARCH PROBLEM

The present investigation proposes to test the interactive buffering hypothesis using cross-sectional survey data on female postal workers. The role of social support in moderating two relationships in the stress process will be examined. First, the study will test the ability of social support to buffer the effect of adverse job conditions on perceived stress. Second, the study will examine whether social support intervenes to buffer the effects of perceived stress on psychological health. The theoretical issues concerning which sources of support act to buffer which occupational stressors will also be considered.

The present study will be unable to address the additive stress buffering model. The additive stress buffering model posits a link between stress and the mobilization of support resources. Increasing stress levels is hypothesized to lead to increasing support levels. An adequate test of this model thus requires the measurement of actual support levels. The data set used in this study contains only measures of perceived support which may or may not index actual support mobilization levels. [1] Given that

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[1]The relationship between perceived support and actual support mobilization is not known (Cohen and Wills, 1985:352). Wethington and Kessler (1986:85) argue that there may not be a direct relationship between perceived support

there is no direct measurement of support levels, a test of the additive stress buffering model would not be appropriate.

This study will be subject to some of the same criticisms besetting previous investigations on the buffering hypothesis. Most notably, the study inherits all the weaknesses inherent in the cross-sectional survey design. Also present are weaknesses in the measurement of key variables. The nature and implications of these weaknesses will be elaborated in the next chapter. In spite of these drawbacks, however, this study can be considered to expand on the findings of previous studies in two important ways. First, the study incorporates objective work conditions in the examination of stress buffering effects. Second, the study considers the moderating role of social support among female workers, a population which has largely been neglected in past research.

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[1](cont'd) and support mobilization. They report that perceived support buffers stress independently of actual support network response.

III. HYPOTHESES AND METHODOLOGY

A. INTRODUCTION

Chapter Two identified the two basic research questions that will be addressed in this thesis. The first question is whether social support acts to moderate the effect of work conditions on the perception of occupational stress. The second question focuses on whether social support is able to moderate the impact of perceived occupational stress on the psychological health of workers. Chapter Three will provide a review and discussion of the methodology that will be used to empirically examine these two research questions.

B. HYPOTHESES

Two hypotheses have been formulated for an empirical test in this research project:

HYPOTHESIS I : The effect of work conditions on perceived occupational stress is buffered by social support. This buffering hypothesis involves three related predictions:

(1) The relationship between adverse work conditions and perceived stress is hypothesized to be positive for those workers who have a low level of social support.

(2) The strength of the relationship between adverse work conditions and perceived stress is posited to decrease as the level of social support increases.

This means that those workers who have higher levels of social support are predicted to be less likely to perceive stress than those workers who have lower levels of support. At the highest level of social support the relationship between work conditions and perceived stress may reduce to zero.

(3) The buffering hypothesis proposes that social support moderates the *positive* impact of adverse work conditions on perceptions of stress. This proposal implicitly entails a third prediction; that is, that the relationship between adverse work conditions and perceived stress is not negative. A negative relationship between adverse work conditions and perceived stress is not consistent with the buffering hypothesis (House, 1981:133).

HYPOTHESIS II : The effect of perceived occupational stress on psychological distress is moderated by social support. This buffering hypothesis also involves three related predictions:

(1) The relationship between perceived stress and psychological distress is predicted to be positive for those workers who have low levels of support.

(2) The strength of the relationship between perceived stress and psychological distress is predicted to decrease as the level of social support increases. Workers who have higher levels of social support are predicted to be less likely to suffer

psychologically from the impact of perceived stress than those workers who have lower levels of support. For those workers who have the highest levels of social support, the relationship between perceived stress and pyschological distress may diminish to zero.

(3) The buffering hypothesis argues that social support buffers the *positive* impact of perceived stress on psychological distress. This argument implicitly involves a third prediction; namely, that perceived stress and psychological distress are not negatively related. A negative relationship between perceived stress and psychological distress is clearly not compatible with the buffering hypothesis.

C. DATA SOURCE

The hypotheses are tested using data collected in a survey of the Edmonton local of the Canadian Union of Postal Workers (CUPW) and of the Letter Carriers Union of Canada (LCUC). A mail-out questionnaire was delivered to all 753 CUPW and 776 LCUC members in the Edmonton area in March,1983. The overall response rate was 65%; 68% for CUPW and 62% for LCUC (Lowe and Northcott,1986:29). For the purposes of the present study, male respondents are excluded; that is, all hypotheses are tested on a sub-sample of female respondents (n=463). Previous tests of the

buffering hypothesis in an occupational setting have almost exclusively relied on male samples (House and Wells, 1978; LaRocco et al., 1980; Karasek et al., 1982; Wells, 1982). Very little is known concerning the degree to which the buffering role of social support affects female employees. It is for this reason that the present study will focus the analysis on female workers. A brief profile of the female respondents reveals that the average age is 30, most have at least 12 years schooling, about one-fifth have children six years or younger at home, and 4.5 is the average number of years spent working with the Edmonton Post Office.

D. VARIABLE SELECTION

To restrict the breadth of this study, a limited number of variables have been selected as indicators of the underlying theoretical constructs. One variable, depression, has been chosen as a measure of psychological health. Two variables, role conflict and lack of variety, have been selected to measure specific dimensions of perceived stress. Two additional measures, which tap general work pressure, have been included as global indicators of perceived stress. It is important to explicitly acknowledge at the onset that the measures selected in this study tap only a few dimensions within each theoretical construct. In particular, role conflict and lack of variety represent only a small sub-set of the variables relevant to the construct of perceived stress. Similiarly, depression, as a variable,

represents only one of many possible aspects of psychological health. It is necessary, therefore, to explain why these particular variables, and not others, have been selected as measures of the underlying theoretical constructs.

The selection of role conflict and lack of variety for this study was based, in part, on past research. Role conflict and lack of variety have been identified by other researchers as representing important aspects of the construct, perceived stress (House et al., 1979; LaRocco et al., 1980; Lowe and Northcott, 1986; Ganster et al., 1986; House et al., 1986). Moreover, some investigators have found that perceptions of role conflict and lack of variety are buffered by social support. Wells (1982) found that social support buffered the effect of work conditions on perceptions of lack of variety. House and Wells (1978) and LaRocco et al. (1980) reported that social support buffered the effect of role conflict on a number of dependent health measures, including depression. Thus, the inclusion of these particular perceived stress variables will allow, to some extent, a replicative test of past research findings.

Role conflict and lack of variety tap only specific aspects of perceived stress. To provide a global assessment of perceived stress, two additional variables which measure pressure at work and problem with pressure at work have been included. The primary purpose of these global measures is to tap the respondents overall assessment of his or her work

pressure.

Depression has been selected as a measure of psychological health in this study. Depression has been included partly because it has consistently been identified as an important dimension of psychological health (Ganster et al., 1986; Lowe and Northcott, forthcoming; Karasek, 1982; LaRocco et al., 1980). As well, depression seems to be a particularly relevant variable for a female sample. The relatively higher incidence of reported depression among females has been well documented (Aneshensel et al., 1981; Amenson and Lewinsohn, 1981; Vredenburg et al., 1986).

E. VARIABLES

1. Social Support

a. A four category response scale was used as an ordinal level measure of perceived support for each of five support sources[2]:

> "How much can each of the following people be relied on for support on or off the job when things get tough at work?" (4=very much, 1=not at all)
> (i) Supervisor
> (ii) Other people at work
> (iii) Spouse (Workers who have no spouse are excluded)
> (iv) Friends

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[2]This ordinal level measurement (as well as all other ordinal measures in this study) will be considered, for all practical purposes, to approximate an interval level measure. The rationale for assuming interval level scales for ordinal measures will be discussed later in the chapter in the section entitled "Statistical Implications of Measurement Error".

(v) Relatives

b. A dummy variable was created to measure the presence or absence of a spouse.

2. Objective Job Conditions

Ideally, the objective work conditions associated with each job at the postal service would be measured by specially trained observers (Wells, 1982:84). An alternative, albeit much less precise, strategy is to identify the cluster of job conditions associated with general job categories. In this study, objective work conditions were operationalized in terms of the two general job classifications in the postal service:

a. Inside Workers

Inside workers are considered to be subject to unpleasant working conditions because these employees function in a factory-like environment, are engaged in routine assembly line processes, are under close supervision, and are subject to shift work (Lowe and Northcott, 1986:32). Letter coders, in particular, have been characterized as performing "intense, fast-paced, repetitive, and monotonous labour under rather rigid supervisory standards" (Northcott and Lowe, 1984:27). Research has linked job conditions such as these to adverse health outcomes (e.g., Caplan et al., 1980).

b. Letter Carriers

Letter carriers are considered to enjoy potentially less

stressful conditions because these workers generally work the day shift, perform tasks out of doors, and function under fairly autonomous conditions without direct supervision (Lowe and Northcott, 1986:32).

3. Perceived Occupational Stress

a. Role Conflict

An index of perceived role conflict was constructed based on a summary of the responses to the following two items adapted from Quinn and Staines (1979):

(i) "On my job I can't satisfy everyone at the same time" (1=Strongly Disagree, 7=Strongly Agree)
(ii) "I am free of the conflicting demands that other people make of me"(1=Strongly Agree, 7=Strongly Disagree)

b. Lack of Variety

Lack of variety indexes the following items (1=strongly agree, 7=strongly disagree):

(i) "My job lets me use my skills and ablilities."
(ii) "My job requires that I be creative."
(iii) "The work I do is meaningful for me."
(iv) "The work is interesting."

These items were also adapted from Quinn and Staines (1979).

c. Global Perceived Stress Measures

Two global measures of perceived occupational stress were used:

(i) "How often do you feel under pressure at work?" (1=never, 5=always)
(ii) "Generally, how much of a problem is the pressure you experience at work?" (1=no problem, 7=very great problem)

4. Depression

The measurement of depression was based on a summary score of the twenty item CES-D scale (Radloff, 1977).

F. MEASUREMENT VALIDITY AND RELIABLITY

Zeller and Carmines (1980:2) define measurement as "the process of linking abstract concepts to empirical indicants". The concepts of validity and reliability are used to clarify the sources of error in the measurement process. In general terms, validity concerns the degree to which empirical indicants measure what they are intended to measure (Kerlinger, 1973:457). Reliability refers to the repeatability and consistency of empirical measurements (Zeller and Carmines, 1980:52). These two concepts, reliability and validity, provide the basis for evaluating the measurements used in this study.

One strategy for evaluating reliability involves assessing the degree of internal consistency among items designed to measure a single underlying dimension. Cronbach's alpha is one of the most commonly used methods of to evaluate internal consistency (Zeller and Carmines, 1980:56). Cronbach's alpha has been calculated for the measurement indexes used in this study. Cronbach's alpha for the depression scale (alpha=.78) and for the lack of variety index (alpha=.78) are both adequate, indicating that there is a relatively high degree of consistency among items within each index.

Cronbach's alpha for the role conflict index is fairly low (alpha=.51). The small number of items composing the index (n=2), however, makes the interpretation of the alpha coefficient problematic. Zeller and Carmines (1980:56) indicate that the value of Cronbach's alpha is a function of both the average interitem correlation and the number of items in the scale. In general, for a given interitem correlation, the value of Cronbach's alpha will increase as the number of items in the scale increases (Zeller and Carmines, 1980:56). [3] Thus, the low reliability coefficient of the role conflict index could be, to some extent, an artifact of the small number of items used to construct the index.

Each of the five sources of social support in this study are measured by one four point response item. It is not possible to estimate the reliability coefficient of a single indicant measured at one point in time. In general, measurement on the basis of a single item represents an undesirable practice because it increases the possiblity of chance error or random response (Kerlinger, 1973:454). This decreases the probability that the observed score on a given item approximates the respondent's true score (Kerlinger, 1973:454; Zeller and Carmines, 1980:52). Thus, confidence in the reliability of measurement for each social support item

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[3]The bivariate pearson's correlation between the two items in the role conflict index is .35. Zeller and Carmines (1980:57) report that the Cronbach's alpha for this type of index could be increased to between .77 and .84 by adding six additional items to the index whose average interitem correlation is at least .35.

is reduced. The four point response scale used for each social support item raises additional concerns about the accuracy of measurement because a four point response scale may not capture precisely the full range of responses. A larger response scale (i.e., for example, a seven point response scale) would have been more desirable.

Work conditions have also been measured on the basis of a single item (inside worker versus outside worker). In this case, it can reasonably assumed that the measurement of work conditions is reliable since it is unlikely that respondents would err in identifying their own job category.

The next issue to be addressed concerns measurement validity. There are a number of different ways measurement validity can be conceptualized. Kerlinger (1973:457) writes that three basic types of validity are most often recognized: criterion-related, content, and construct validity. Criterion-related validity refers to "the correlation between a measure and some criterion variable of interest" (Zeller and Carmines, 1980:79). There are two types of criterion-related validity; concurrent and predictive. Concurrent validity is assessed when the correlation is between a measure and a criterion at the same point in time. Predictive validity, by contrast, involves a correlation between a measure and a future criterion. In both cases, criterion validity is solely determined by the strength of association between a measure and a given criterion (Zeller and Carmines, 1980:80).

Criterion validity is considered atheoretical because no theoretical link is required between a measure and a given criterion. The focus is typically on selecting a criterion that is relevant from a practical perspective. For example, later academic records could be selected as a criterion for scholastic aptitude test scores (Kerlinger, 1973:459). This type of validity is often not assessed in social science research because of the difficulty in specifying an appropriate criterion for which to evaluate abstract social variables (Kerlinger, 1973:460). House and Kahn (1985:86), for example, argue that there is no criterion validity against which measures of social support can be assessed. It is because of the difficulty in identifying an appropriate criterion that criterion-related validity will not be evaluated in this study.

Content validity, also referred to as face validity, concerns "the extent to which a set of items taps the content of some domain of interest"(Zeller and Carmines, 1980:78). To the extent that items encompass the full domain of content, they can be considered content valid. Content validity involves a judgemental process; items are essentially 'judged' as to their representativeness or relevance to the underlying content domain (Bailey, 1978:58).

With respect to the measures in this study, both role confict and lack of variety appear to have good content validity. The items within each index seem to be tapping the

content domains relevant to the constructs role conflict and lack of variety. These items have been adapted from the measures of perceived occupational stress used in the 1977 U.S. Quality of Employment Survey (See Quinn and Staines, 1979). Other occupational stress investigators have also adopted items that are similiar (in some cases identical) in content, to measure role conflict and lack of variety (i.e., House et al., 1979; LaRocco et al., 1980;).

The measurement of depression appears to have good content validity. The items used to compose the CES-D scale have been carefully selected to be representative of the content domain defined by depression (Markush and Favero, 1974). It is evident that other researchers have judged this scale to have good content validity because the CES-D is a widely used measurement of depression.

Weak content validity in the measurement of social support has been one of the most prominent criticisms of research testing for stress-buffering effects. In this study, the operationalization of the social support variable identifies the degree of support that the respondent reports for work-related problems from five different sources of support. This kind of operationalization has been criticized for failing to distinguish between the forms of support (e.g., socio-emotional or instrumental) that the respondent receives from different sources. It was noted in the previous chapter, that House (1981:39) has argued that social support is an interpersonal transaction that involves

one or more of the following: (1) Emotional concern (liking, love, empathy), (2) Instrumental aid (goods or sevices), (3) Information (about the environment) or (4) Appraisal (information relevant to self-evaluation). The content domain identified by House (1980) is not represented in the measurement of social support used in this study. The single item used to measure social support taps only the perception of support from different support sources. The specific content of the perceived support is not measured.

Obvious weaknesses in content validity exist in the measurement of work conditions. The measurement of work conditions does not include any direct measurement by specially trained observers of the specific work characteristics (e.g., supervision level, work load, task variety) associated with each job category. Measurement of specific work conditions by trained observers would have permitted a finer discrimination in targetting which specific job conditions are buffered by social support.

Construct validity has been identified as the most useful and important type of validity with which to assess measures in the social sciences (Kerlinger, 1973:461; Zeller and Carmines, 1980:83; House and Kahn, 1985:86). Construct validity refers to the "extent to which a particular measure relates to other measures consistent with theoretically derived hypotheses." (Carmines and Zeller, 1979:23). Construct validity rests on the logic that the theory which relates different concepts to one another also relates the

empirical indicants which measure these concepts in a specified pattern. Thus, for example, if theory predicts that the construct, perceived stress, is related to another construct, depression, then one would expect that the indicators which measure these two concepts would be empirically related. Construct validation assesses the degree to which the empirical associations displayed by a given measurement conforms to theoretical expectations. Construct validation is, for this reason, always embedded in a particular theoretical context (Zeller and Carmines, 1980:81).

Construct validation represents a theoretically technical and lengthy process. Zeller and Carmines (1980:82) state that construct validation "requires a pattern of consistent findings involving different researchers across a significant portion of time and with regard to a variety of diverse but theoretically relevant variables". Obviously, this discussion will be able to address only a very small part of the process of construct validation.

There is some evidence that the empirical measures of work conditions, perceived stress, and depression, used in this study have some construct validity. One theoretical model of occupational stress asserts that the stress process can be conceptualized as a causal chain which links, in sequence; (1) the objective work environment, (2) the perceived environment, (3) the short-term responses (physiological, behavioral, affective), and (4) the health

and disease outcomes (Kasl and Wells 1985:180). This theoretical model leads to the expectation that the empirical measures of work conditions, perceived stress, and depression should be positively correlated. Lowe and Northcott (1986) found that adverse work conditions were positively related to the measures of role conflict and lack of variety. In another study, Lowe and Northcott (forthcoming), found that measures of work conditions, role conflict, and lack of variety were all positively related to depression. These empirical associations displayed by role conflict, lack of variety, and depression appear to conform to the theoretical predictions of the occupational stress model reviewed earlier. This constitutes one piece of evidence in favor of the construct validity of these measures.

Theoretically, one would also expect that measures of perceived stress would be negatively related to measures of job satisfaction (LaRocco et al., 1980:203). Northcott and Lowe (1987) found that degree of variety is an important predictor of job satisfaction. Role conflict was also found to have a significant negative effect on perceptions of job satisfaction but for women only. Why role conflict would affect perceptions of job satisfaction differently for males and females is not entirely clear. In general, however, these findings tend to increase confidence that the measurement of role conflict and lack of variety are reflecting aspects of the underlying theoretical construct,

perceived stress.

One final caveat is in order. It is possible that the measurements in this study reflect the respondent's response set instead of the presumed underlying theoretical constructs. In this study, as well as in most other studies of occupational stress, the measures of social support, stress, and health outcomes are obtained from the self-reports of respondents in a single questionnaire. This practice can lead to inflated correlations between perceived stress, social support, and health measures because of the influence of common method variance and response consistency effects (Depner et al., 1984:42; Ganster et al., 1986:104). In this case, the correlations between all the measures cited could reflect, to some degree, a shared response set or an underlying personality disposition rather than a causal relationship (House et al., 1979:105; Depner et al., 1984:42). It will not be possible to control for this kind of threat to the construct validity of the measures used in this study.

G. STATISTICAL METHODS

The hypothesis that the impact of work conditions on perceived stress is buffered by social support predicts that two independent variables, work conditions and social support, interact in their causal effects on the independent variable, perceived stress. This hypothesis can be modelled statistically with a multiplicative regression model;

$$PS = b_0 + b_1WC + b_2SS + b_3(WC)(SS) + e \quad (1)$$

where PS=perceived stress, WC=work conditions, and SS=social support. Hayduk and Wonnacott (1980:400) present an equivalent equation which conceptually clarifies the interaction term:

$$PS = b_0 + b_2SS + (b_1 + b_3SS)WC + e \quad (2)$$

The term $(b_1 + b_3SS)WC$ captures the interactive causal effects of social support and work conditions on perceived stress. This term illustrates that the effects of work conditions on the perception of stress is conditional on the current level of social support. If the slope of the interaction term (b_3) is negative, then as social support increases the effect of work conditions on perceived stress decreases. In this context, social support acts to buffer the effects of work conditions on perceived stress.

The hypothesis that the impact of perceived stress on depression is buffered by social support indicates that the independent variables, perceived stress and social support, causally interact in their effects on the dependent variable, depression. Again, this hypothesis can be modelled statistically with a multiplicative interaction term;

$$D = b_0 + b_1PS + b_2SS + b_3(PS)(SS) + e \quad (3)$$

where D=depression, PS=perceived stress, and SS=social support. The equation can be reexpressed in the equivalent form;

$$D = b_0 + b_2SS + (b_1 + b_3SS)PS + e \quad (4)$$

In this equation, the effect of perceived stress on

depression is conditional on the present level of social support; the effect of perceived stress on depression is b_1 augmented by b_3 times the current level of social support. Thus, when the estimated value of the slope for the interaction term (b_3) is negative, the effect of perceived stress on depression decreases as the level of support increases.

Both the hypothesis that work conditions and social support interact in their effects on perceived stress and the hypothesis that perceived stress and social support interact in their effects on depression can be tested by assessing the significance of the R^2 increment when the interaction term is added to the main effect equation. More specifically, to test the first hypothesis, a multiplicative interaction term, social support x work conditions, will be added to the equation regressing perceived stress on work conditions and social support. The significance of the R^2 increment when the interaction term is added to the main effect equation indicates whether the interactive effects of social support and work conditions are able to explain any variance in the dependent variable over and above that explained by work conditions and social support alone. To test the second hypothesis, a multiplicative interaction term, social support x perceived stress, will be added to the equation regressing depression on perceived stress and social support. Again, a significant increase in R^2 indicates that the combined effects of social support and

pereived stress are able to explain variance in the dependent variable over and above the variance explained by social support and work conditions alone.

In both these cases, the null hypothesis is that there is no interaction effect either between work conditions and social support or between perceived stress and social support. This null hypothesis, which predicts that the R^2 increment in the population is zero, can be tested by using the partial F test.

There are a number of disadvantages to relying solely on product term regression analysis when testing for interaction effects. First, it is anticipated that the social support x perceived stress interaction term and the social support x work conditions interaction term will both correlate very highly with their respective constituent variables since the interaction term is "an exact non-linear function" of the constituent variables (Blalock, 1979:492). A high correlation among predictor variables will create a multicollinearity problem with estimated coefficients having high standard errors (Blalock, 1979:493; Winnubst et al., 1982:478; Karasek et al., 1982:184). The second disadvantage of product term regression analysis is that it is not able to reveal the precise nature of a significant interaction. The basic product term approach represents an omnibus test of an interaction; it is able to indicate whether the effects of one variable vary across levels of another variable. It does not reveal the pattern of interaction;

whether, for example, the interaction is monotonic across all levels of the stress-functioning relationship or whether the interaction is subject to threshold or curvilinear effects (Finney et al., 1984:92).

It is for these reasons that sub-group analysis will be used in conjunction with product term regression analysis to probe the moderating role of social support. Four social support groups will be formed, one group for each level of response on the social support scale: 4 = High support group, 3 = Med-High support group, 2 = Med-Low support group, 1 = Low support group. To test the hypothesis that social support buffers the impact of job conditions on perceived stress, perceived stress will be regressed on job conditions in each of the four social support groups. The buffering hypothesis predicts that the slope of the relationship between job conditions and perceived stress will be positive in the low support group. The impact of work conditions on perceived stress is predicted to decrease as social support increases. This can be restated: b_1 for high support group < b_2 for med-high support group < b_3 for med-low support group < b_4 for low support group. The relationship between perceived stress and work conditions is not expected to be negative in any social support group.

To test the hypothesis that social support buffers the impact of perceived stress on depression, depression will be regressed on perceived stress in each of the four social support groups. The buffering hypothesis predicts that the

relationship between perceived stress and depression will be positive in the low social support group. The effects of perceived stress on depression are predicted to vary across social support groups such that b_1 for high support < b_2 for med-high support < b_3 for med-low support < b_4 for low support. No social support group is expected to display a negative relationship between work conditions and perceived stress.

The significance of the difference between the regression coefficients within each social support group will be assessed by using a one-tailed Z test:

$$Z = \frac{b_1 - b_2}{\sqrt{SE_{b_1}^2 + SE_{b_2}^2}} \qquad (5)$$

(Northcott and Lowe, 1987:125).

H. METHODOLOGICAL AND STATISTICAL ISSUES

1. Specification Error

Specification error occurs when the model being estimated is incorrect. Specification error can result when important variables have been omitted from a model, when irrelevant variables have been inadvertently placed in a model, and when the functional form chosen to represent the variables is in error (Bohrnstedt and Carter, 1971:128). There appear to be two potential sources of specification error in this research project. First, it is possible that

some other unspecified variable(s) may be responsible for the stress-buffering effects attributed to social support. For example, Cohen and Wills (1985:353) suggest that "the effects attributed to social support may be partially or wholly attributable to personality traits such as competence or sociability that are highly correlated with support." It is possible that those indidviduals who have good social competency skills may also tend to have high social support levels and high levels of psychological health. Social competency could be seen as the common cause linking high levels of social support with high levels of psychological health. If this really is the case, then it might be more accurate to model social competency, and not social support, as a stress-buffer. However, given that there is no measurement of personality variables such as social competence in this research design, it will not be possible to rule out this sort of rival explanation.

A second potential source of specification error could result if the direction of the causal relationship between perceived stress and psychological health has been modelled incorrectly. It is conceivable that a reciprocal relationship could exist between the perception of stress and psychological distress (Kessler, 1983:308). The model estimated in this study specifies that the perception of stress leads to psychological distress. The model does not allow for the possibility that the pychological distress felt by the respondent could selectively affect the

respondent's perception of stress. One statistical consequence of specification error is that it almost always leads to "a misestimation of the magnitude of some causal parameter" (Cohen and Cohen, 1983:376). In this particular case, artificially high estimates of the effects of perceived stress on pychological distress would be obtained if a reciprocal causation between these variables is, in reality, operating and not specified in the model (Kessler, 1983:308).

2. Statistical Implications of Measurement Error

Multiple regression analysis assumes the existence of an underlying interval or ratio scale. The multiple regression analysis conducted in this study employs, with the exception of the dichotomous measurement of work conditions and spouse presence/absence, measures at the ordinal level. This practice has been justified by other researchers. Kerlinger (1973:440) states that most psychological and sociological ordinal scales tend to approach interval equality. It is because of this that ordinal scales can often be used as if they were interval scales without resulting in any gross distortion or error. Similiarily, Bohrnstedt and Carter (1971:131) report that "statistical tests are robust enough to allow the researcher to use them with little fear of gross error regardless of whether or not he has an interval or ratio scale so long as his ordinal measure is monotonically related to the

underlying true scale." The decision to treat ordinal level measures as approximating interval level measures is an essentially pragmatic one because it allows the researcher to use the most powerful tools available in analyzing data (Kerlinger, 1973:440). Any minor errors in inference that may occur as a result of employing ordinal measures in multiple regression analysis is more than offset by the increase in statistical power (Bohrnstedt and Carter, 1972:131).

One important issue with respect to the statistical consequences of measurement error focuses on the unreliability of measuring instruments. Multiple regression analysis is not robust in the presence of unreliable measures. Bohrnstedt and Carter (1971) have shown that reliability in the measurement of the independent variables is particularly important. Unreliablility in the measurement of the predictor variables in multiple regression leads to biased estimates (inflated or attenuated) of regression coefficients (Bohrnstedt and Carter, 1971:136; Cohen and Cohen, 1983:410). Moreover, measurement unreliability in independent variables *always* attenuates the multiple correlation coefficient (Bohrnstedt and Carter, 1972:137). This consequence can be intuitively grasped from the fact that random error variance is inflated by measurement unreliability.

The section on measurement reliability and validity covered earlier revealed specific concerns regarding the

potentially unreliable measurement of social support and role conflict. The interpretation of the reliability coefficient for the role conflict index was seen to be problematic because only two items are used to compose the index. The reliability coefficient for social support was not calculable because only one item is used to measure each source of social support.

The potentially unreliable measurement of social support and role conflict has consequences for the test of the stress buffering hypothesis in this study. In multiple regression equations where an unreliable measure of social support or role conflict is used as a predictor, the explained variance will be attenuated. This is because any errors in the measurement of role conflict or social support will lead to an inflation of the errors in prediction or in the unexplained variance (Bohrnstedt and Carter, 1971:137). Thus, to the extent that the measurement of role conflict and social support is unreliable, a more conservative test of the stress buffering hypothesis will result. For example, unreliability in the measurement of social support means that all of the predictor social support x stress interaction terms will be less likely to reach significance in the R^2 increment test due to the increased error variance. Unreliability in the measurement of role conflict means that in the sub-group analysis, the coefficients estimating the effects of role conflict on depression in each of the four social support groups will be attenuated

(Bohrnstetd and Carter, 1971:133).

3. Interpretation of Main and Interactive Effects

There has been some debate and confusion concerning the interpretation of the main effects in multiple regression equations that include cross-product interaction terms. The equations modelled previously incorporated a multiplicative interaction term of the general form;

$$Y = b_0 + b_1 ST + b_2 SS + b_3 (ST)(SS) + e \qquad (6)$$

where Y=psychological health, ST=stress, and SS=social support. The debate has focused on two main issues. The first issue concerns the interpretation that should be given to the constituent terms, stress and social support, when the stress x social support cross-product term is found to be *significant*. (House, 1981; Cleary and Kessler, 1982; Finney et al., 1984). The second issue focuses on the type of regression model that should be estimated when the cross-product stress x social support term is found *not to be significant* (Finney et al., 1984).

House (1981:132) has argued that in presence of a *significant* stress x social support term both the constituent coefficients (b_1 and b_2 in equation 6) can, under certain assumptions, be interpreted as estimating the main effects of social support and stress on psychological health. According to House (1981) the partial regression coefficient for social support (b_2) can be thought of as estimating the main effect of social support on

psychological health *when* stress is equal to zero. Similiarly, the partial regression coefficient for the stress variable (b_1) can be thought of as estimating the main effect of stress on psychological health *when* social support is zero.

The assumption that there is a real zero point in either the measurement of stress or social support does not seem justified. It would be difficult to conceive of an individual exposed to a zero level of stress or an individual totally lacking in social support resources. Rather than arguing that real zero points exist in either stress or social support, it would be more reasonable to argue that some individuals have low levels of stress or low levels of social support. Once the assumption of real zero points is rejected, then the slopes of the constituent terms, social support and stress, can no longer be said to represent main effects. The estimated slopes for the constituent terms assess the effects of one constituent variable (e.g., stress) at a low level of the other constituent variable (e.g., social support). Given a significant interaction term, this represents only one estimate out of a number of possible specific conditional effects (Finney et al., 1984:88).

Cleary and Kessler (1982) have adopted the position that there can be no main effects for social support or stress in the presence of a significant interaction between social support and stress. A main effect refers to an effect

that is constant across all levels of the dependent variable, irrespective of the presence or absence of another variable (Cleary and Kessler, 1982:160). By definition, a significant interaction indicates that the effect of one variable (e.g., stress) on a dependent variable (e.g., psychological health) is conditional on the level of another variable (e.g., social support). In this case, there is no constant effect and hence, there is no main effect. The position adopted in this research paper is in agreement with Cleary and Kessler (1982), that there are no main effects for constituent terms in the presence of a significant interaction.

A second issue remains. This concerns the multiple regression model that should be estimated when the social support x stress interaction term is found *not to be significant*. Basically, there are two options that can be followed when the interaction term is found to be insignificant (Finney et al., 1984:90). The first option is to retain the insignificant interaction term in the model estimation. The second option involves dropping the insignificant interaction term and reestimating an additive, main effect model. The option chosen appears to rest on the degree of theoretical grounding in the the statistical model (Finney et al., 1984:91). The main concern is whether the statistical model is driven by *a priori* theory or exploratory data analysis. When the statistical model is exploratory in nature, the data dictate the model. In this

case, non-significant terms tend to be dropped from the model. When the statistical model is built largely on *a priori* theory, non-significant interaction terms tend to be retained. In this instance, the data function to estimate an a priori model, not change it. The multiplicative regression analyses used in this research project reflect a primarily theoretical contruction. For this reason, non-significant interaction terms will be retained in model estimation.

IV. TESTING THE HYPOTHESES

A. INTRODUCTION

Chapter Three provided a review of the methodology that will be used to examine two hypotheses. The first hypothesis predicts that the effect of work conditions on perceived occupational stress will be buffered or moderated by social support. The second hypothesis states that the effect of perceived occupational stress on psychological health will be buffered or moderated by social support. Chapter Four will test both of these hypotheses. The major findings will be highlighted and discussed.

B. TEST OF HYPOTHESIS I

Hypothesis I: The effect of work conditions on perceived occupational stress is buffered by social support. This hypothesis entails three related predictions:

(1) The relationship between adverse work conditions and perceived stress is predicted to be positive for those workers who have a low level of social support.

(2) The strength of the relationship between adverse work conditions and perceived stress is hypothesized to decrease as the level of social support increases.

(3) At any given level of social support, the

relationship between adverse work conditions and perceived stress is not expected to be significantly less than zero (i.e., negative). A negative relationship between work conditions and perceived stress is not compatible with the buffering hypothesis.

1. Adequacy of the Regression Model

The buffering hypothesis was tested using a multiple regression model in both the R^2 increment analysis and the sub-group analysis. Each multiple regression equation estimated in testing the buffering hypothesis was examined carefully to verify that the major assumptions underlying the regression model had not been violated.

The assumption of a linear relationship between the independent variables and the dependent variable is an important assumption underlying regression analysis that is not robust to violation (Bohrnstedt and Carter, 1971:130). Linearity was verfied by plotting the regression residuals against the predicted values. A random relationship between the residuals and the predicted values provides evidence for a linear relationship between predictor and dependent variables (Norušis, 1983:148). There was no indication that a non-linear relationship between the independent variables and the dependent variable existed in the regression equations estimated.

Multiple regression analysis also assumes that the error terms are normally distributed. This assumption was tested by checking the normality of the distribution of residuals for each regression equation. In some instances, mild to moderate violations of normality were observed. No corrective action was taken, however, because this particular assumption has been shown to be quite robust to even moderate violations (Norušis, 1983:152; Bohrnstedt and Carter, 1971:123).

Another assumption of multiple regression analysis is homoscedasticity. That is, the error variance for every level of the predictor variable is assumed to be constant. Homoscedasticity can be checked by plotting the residuals against the predicted values. If the spread of residuals increases or decreases with the predicted values, then the assumption of homoscedasticity can be questioned (Norušis, 1983:148). No evidence of extreme heteroscedasticity was observed.

The existence of outliers or 'extreme residuals' can threaten the adequacy of multiple regression analysis by affecting the proportion of explained variance and the estimated slopes (Cohen and Cohen, 1983:128). Although the formal definition of an outlier is essentially arbitrary, Cohen and Cohen(1983:128) suggest that any standardized residual greater than three units can reasonably be considered an outlier. For all regression equations estimated, no standarized residuals greater than three units

were observed.

2. R^2 Increment Analysis

R^2 increment analysis was used to determine whether the interactive effects of work conditions and social support were able to explain any unique variance in perceived stress over and above the variance explained by work conditions and social support alone. This represents an omnibus test of the buffering hypothesis. A significant R^2 increment indicates that the effects of work conditions on perceived stress are not constant, but vary across levels of social support.

The results of the R^2 increment analysis for the first buffering hypothesis are presented in Table 1. Four dependent perceived stress variables were estimated; lack of variety, role conflict, pressure at work, and problem with pressure at work. Six separate measures of social support (perceived support from supervisor, coworker, spouse, friend, and relative and spouse presence/absence) and one measure of work conditions (inside worker versus outside worker) were used as independent variables. The social support variables were used in separate equations rather than in combination. This meant that each of the four perceived stress variables were estimated using six separate equations. In total, 24 separate equations were used to assess the effects of social support, work conditions, and the significance of the social support x work conditions interaction term.

Table 1 reveals that only four of the 24 interaction terms tested reached significance ($p<.10$) using the *F* test. Supervisor support and work conditions were found to interact in their effect on perceived job variety; coworker support and work conditions were also found to interact in their effect on perceived job variety; support from relatives was found to moderate the effect of work conditions on perceived role conflict; and finally, spouse support was found to moderate the effect of work conditions on perceived problem with pressure. Overall, the interaction of social support and work conditions was able to explain a significant proportion of the variance in the perceived stress measures in only 17 per cent of the equations examined. In 83 per cent of the equations tested, the interaction of social support and work conditions failed to account for any significant variance in perceived stress.

3. Sub-group Analysis

It has been noted that a test of the significance of the social support x work conditions interaction term represents an omnibus test of the buffering hypothesis. A significant interaction term reveals that the effects of work conditions on perceived stress vary across, or are conditional on, levels of social support. It does not reveal, however, *how* the causal effects of work conditions on perceived stress vary across levels of social support. A significant interaction term may or may not display the

Table 1. Multiple Correlation Coefficients for the Regressions of Perceived Stress on Work Conditions, Support, and Work Conditions x Support

Dependent Variable	Independent Stress Variable	Independent Support Variable	Main Effect Equation[1] R_1^2	Main Effect Equation With Interaction Term[2] R_2^2	F_{change}[3]
Variety	Work conditions	Supervisor	.10	.13	13.61**
		Coworker	.04	.05	3.94**
		Spouse	.04	.04	.95
		Friend	.04	.04	.00
		Relative	.04	.04	.55
		Spouse pres/absent	.04	.04	.00
Role Conflict	Work conditions	Supervisor	.06	.06	1.91
		Coworker	.02	.02	.11
		Spouse	.03	.03	.24
		Friend	.02	.02	.20
		Relative	.02	.02	3.26*
		Spouse pres/absent	.03	.03	.41
Problem with Pressure	Work conditions	Supervisor	.07	.07	.56
		Coworker	.02	.02	.00
		Spouse	.02	.05	9.29**
		Friend	.02	.02	.41
		Relative	.02	.02	.01
		Spouse pres/absent	.03	.03	2.02
Pressure at Work	Work conditions	Supervisor	.05	.05	.08
		Coworker	.01	.01	1.06
		Spouse	.03	.04	1.96
		Friend	.02	.01	.00
		Relative	.01	.01	1.00
		Spouse pres/absent	.02	.02	1.46

**significant at $p<.05$ *significant at $p<.10$

[1] $Y=b_0+b_1$Work conditions$+b_2$Support

[2] $Y=b_0+b_1$Work conditions$+b_2$Support$+b_3$Work conditions x Support

[3] $F_{change}=\frac{(R_2^2-R_1^2)/(k_2-k_1)}{(1-R_2^2)/(n-k_2-1)}$ where k is the number of independent terms in the equation. This tests the significance of the work conditions x support term.

specific interactive pattern predicted by the buffering hypothesis.

Sub-group regression analysis was used to assess whether the four significant interaction terms shown in Table 1 displayed a pattern of interaction consistent with the pattern predicted by the buffering hypothesis. The sub-group analysis involved regressing perceived stress on work conditions within low, medium-low, medium-high, and high support groups. For each interaction, the buffering hypothesis predicts that the effect of work conditions on worker perceptions of stress will be positive for those workers in the low social support group. Furthermore, the slope of the relationship beween work conditions and perceived stress is predicted to vary across social support groups such that b_1 for the high support group < b_2 for the medium high support group < b_3 for the medium low support group < b_4 for the low support group. At no level of social support is the relationship between work conditions and perceived stress predicted to be negative. The results of the sub-group regression analysis for each of the four significant interactions are provided in Table 2.

Table 2 reveals that the interactive effect of work conditions and supervisor support on perceived lack of variety is consistent with the buffering hypothesis. In the low supervisor support groups, the relationship between work conditions and perceived lack of variety is positive. Moreover, the effect of work conditions on perceived variety

Table 2. Regression Coefficient Differences in the Regression of Perceived Stress on Work Conditions in Low, Medium-low, Medium-high, and High Support Groups

Dependent Variable	Independent Stress Variable	Support Group	Regression Coefficient for Work Conditions Within Each Support Group: low b_1	med-low b_2	med-high b_3	high b_4	Significance Level of Regression Coefficient Differences[1]: $b_1>b_2$	$b_1>b_3$	$b_1>b_4$	$b_2>b_3$	$b_2>b_4$	$b_3>b_4$
Variety	Work Conditions	Supervisor	1.04**	.59**	.19	-.43	.08*	.01**	.01*	.10*	.02**	.10*
Variety		Coworker	-.08	.76**	.75**	.53*	--	--	--	.49	.27	.26
Role Conflict		Relative	-.03	.57*	.52*	.63**	--	--	--	.46	--	--
Prob Pressure		Spouse	1.81**	.16	1.07**	.15	.06*	.20	.02**	--	.45	.01**

**significant at $p<.05$

*significant at $p<.10$

[1]The significance of the regression coefficient differences between support groups is assessed using a one-tailed Z test where $Z=b_1-b_2/\sqrt{SE^2_{b_1} + SE^2_{b_2}}$. The Z test is not employed where the direction of the difference between regression coefficients is inconsistent with the predicted pattern. Thus, empty cells designate a directional difference between regression coefficients inconsistent with the predicted direction.

varies across social support groups in the pattern predicted by the buffering hypothesis. As the level of supervisor support increases, the strength of the relationship between work conditions and perceived lack of variety decreases significantly and consistently. At the two highest levels of supervisor support, the strength of the relationship between work conditions and perceived lack of variety diminishes and is not significantly different from zero.[4] Figure 1 provides a visual representation of the slopes predicting lack of variety from work conditions within the four support groups. It can be clearly seen from Figure 1 that the effect of work conditions on perceptions of lack of variety decreases systematically as the level of supervisor support increases.

In reviewing Table 2 again, it is apparent that the interactive effect of work conditions and coworker support on perceptions of variety is not compatible with the buffering hypothesis. Contrary to the buffering hypothesis, the strength of the relationship between work conditions and perceived lack of variety is insignificant for those workers who have the lowest level of coworker support. As well, the effect of work conditions on perceptions of variety does not vary across support groups in the pattern predicted by the buffering hypothesis. That is, there are no significant differences in the effect of work conditions on perceptions of variety between medium-low, medium-high, and high support

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[4]At the highest level of supervisor support the estimated coefficient has a negative sign but this coefficient is not significantly different from zero.

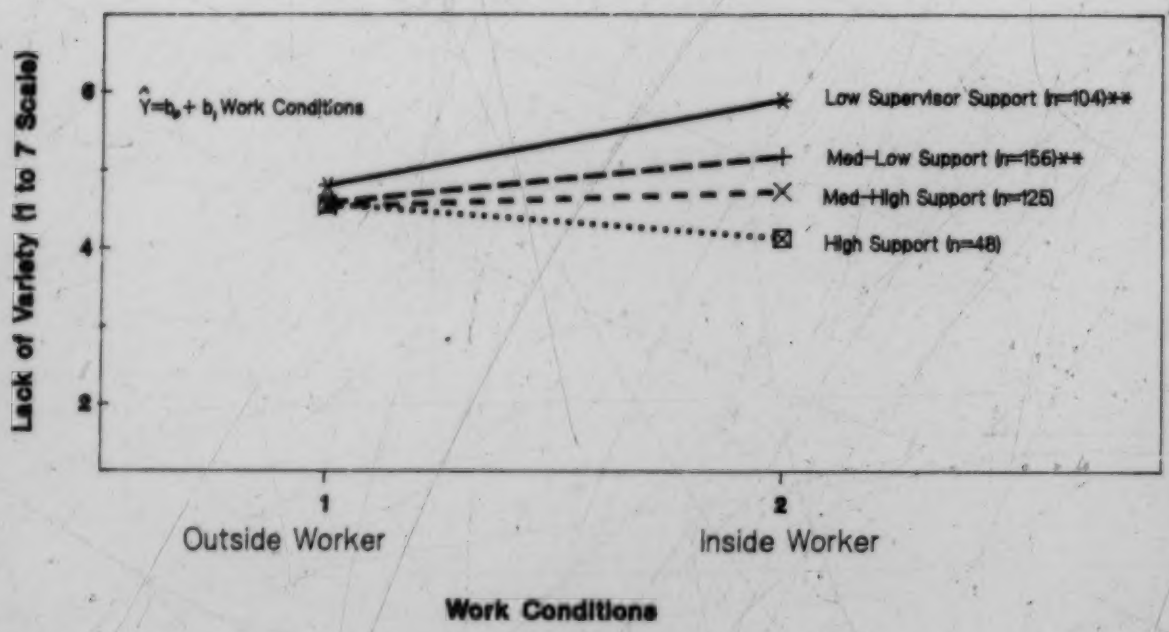

Figure 1. Supervisor Support Buffering the Relationship Between Work Conditions and Perceived Lack of Variety

** Significant at $p<.05$

groups.

Table 2 also reveals that the interactive effects of work conditions and relative support on perceived role conflict is not consistent with the buffering hypothesis. At the lowest level of relative support, the relationship between work conditions and perceptions of role conflict is not significant. Furthermore, the effect of work conditions on perceived role conflict does not decrease as the level of social support increases. On the contrary, most of the differences in the effect of work conditions on perceived role conflict between support groups are in an opposite direction to that predicted by the buffering hypothesis. The one difference between support groups that is in the predicted direction is not significant. Overall, the interaction between work conditions and relative support fails to substantiate the buffering hypothesis.

Looking at Table 2 once more, it appears that the interaction of work conditions and spouse support is, at least in part, consistent with the buffering hypothesis. Figure 2 illustrates the slopes predicting perceived problem with pressure for each of the four spouse support groups. The relationship between work conditions and perceived problem with pressure is significant and positive for those workers who have the lowest level of spouse support. The comparison in Table 2 of the effects of work conditions on perceived problem with pressure between the two most extreme high and low support groups is consistent with the buffering

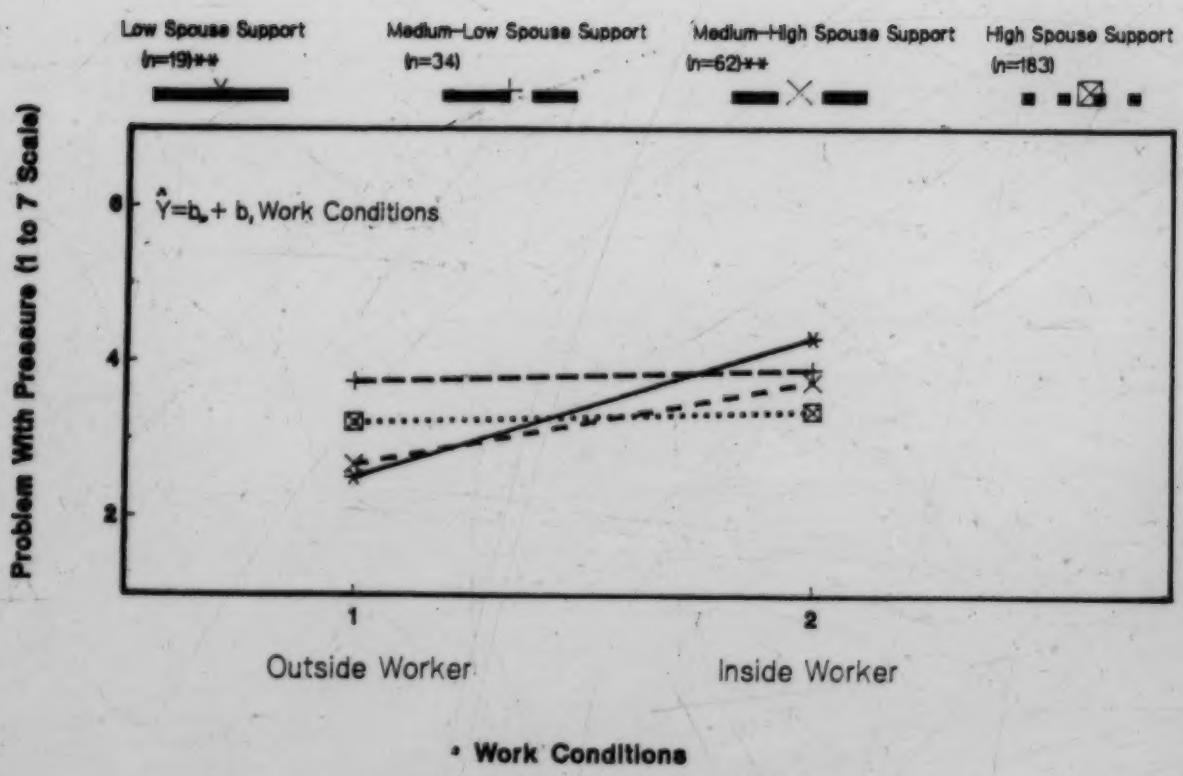

Figure 2. Spouse Support Buffering the Relationship Between Work Conditions and Perceived Problem With Pressure

** Significant at p<.05

hypothesis. The effect of work conditions on perceived problem with pressure is significantly greater for those workers who have the lowest level of spouse support compared to those workers who have the highest level of spouse support. At the highest level of spouse support, the effect of work conditions on perceived problem with pressure diminishes to zero.

The contrast between medium-low and medium-high spouse support groups is not compatible with the buffering hypothesis. The impact of work conditions on perceived problem with pressure is lower in the medium-low group than in the medium-high group. This inconsistency is difficult to explain. The inconsistency may, in part, be attributable to the response scale used to differentiate the support groups. It will be remembered that the support groups were formed based on the responses to a four point scale where, 1=low support, 2=medium-low support, 3=medium-high support, and 4=high support. The one point scale difference which differentiates medium-low and medium-high support groups may, in reality, be somewhat tenuous. However, the magnitude of the difference in regression coefficients (b_3 medium low support=.16 versus b_3 medium-high support=1.07) between support groups argues against this interpretation. If the distinction between medium-low and medium-high support groups is indeed tenuous, then it becomes difficult to explain the significant difference between the slopes for the medium-low and medium-high groups ($p<.01$). Moreover, it

is also difficult to explain these inconsistent results in terms of the relatively small sample size for the medium-low group, given that the sample size for this group is 34. In summary, there does not seem to be any apparent explanation that would account for the failure of the contrast between the medium-low and medium-high support groups to substantiate the buffering hypothesis.

4. Summary of Results

Data analysis involved primarily two steps. In the first step, a work conditions x social support interaction term was added to the main effect equation regressing perceived stress on social support and work conditions. The significance of the R^2 increment was used to determine whether the interactive effects of social support and work conditions were able to explain variance in perceived stress over and above the variance explained by the effects of social support and work conditions alone. This R^2 increment analysis found four significant work conditions x social support interaction terms out of a total of 24 terms tested.

In the second step of data analysis, the four significant interaction terms were tested once again in sub-group regression analysis to ascertain whether these interactions displayed a pattern consistent with the buffering hypothesis. The sub-group regression analysis basically involved a comparison of the effect of work conditions on perceived stress between low, medium-low,

medium-high, and high support groups. The sub-group regression analysis revealed that the interactive effects of work conditions and supervisor support on perceived variety was completely consistent with the buffering hypothesis. The interactive effects of work conditions and spouse support on perceived problem with pressure was only partially consistent with the buffering hypothesis. The two remaining interactions were between work conditions and coworker support and between work conditions and relative support. Neither of these interactions displayed a conditional pattern in the sub-group analysis that was compatible with the buffering hypothesis.

Overall, the data analysis has failed to provide strong evidence for the hypothesis that social support buffers the impact of work conditions on perceived occupational stress. Of the 24 interaction terms tested, only four or 17 per cent reached significance. Moreover, of the four significant interaction terms, only one displayed a conditional pattern across social support groups that was consistent with the buffering hypothesis. One other interaction proved to be only partially consistent with the buffering hypothesis. It is possible that these two buffering interactions could have occurred by chance alone. More important, however, there is no theoretical explanation for why these two particular interactions, and not others, proved to be consistent with the buffering hypothesis. Why, for example, should supervisor support buffer the impact of work conditions only

on perceptions of job variety and not on perceptions of role conflict or on problems with pressure? In the context of so many insignificant results, two positive findings are theoretically ambiguous.

C. TEST OF HYPOTHESIS II

HYPOTHESIS II: The effect of perceived stress on depression is moderated by social support. This hypothesis involves three related predictions:

(1) The relationship between perceived stress and depression is predicted to be positive for those workers who have low levels of social support.

(2) The strength of the relationship between perceived stress and depression is predicted to decrease as social support increases.

(3) At no level of social support is the relationship between perceived stress and depression expected to be significantly less than zero (i.e., negative).

1. Adequacy of the Regression Model

The second buffering hypothesis was tested using an R^2 increment analysis and sub-group analysis. Both of these procedures involve a regression model. As with the first buffering hypothesis, each estimated regression equation was examined carefully to ensure that the major assumptions underlying the regression model had not been violated.

Analysis of regression residuals provides the basis for assessing the adequacy of the regression model. The assumption of linearity was checked by plotting the residuals against the predicted values. There was very little evidence in the residual plots that a non-linear relationship existed between the independent and dependent variables. The scatterplots of the residuals also revealed no extreme instances of heteroscedasticity. A histogram of the residuals was used to check the normality of the error terms. No excessively marked violations of normality were observed. In approximately one half of the regression equations estimated, one or two standardized residuals greater than three units were found. For any given regression equation, however, these outliers represented a very small proportion of the sample (.45% or less) and for this reason, they proved to have a negligible effect on the regression estimates. Consequently, all outliers were retained in estimating the regression model.

2. R^2 Increment Analysis

R^2 increment analysis was used to test whether the combined effects of perceived stress and social support were able to explain any variance in depression over and above the variance explained by perceived stress and social support alone. A significant R^2 increment reveals that the effect of perceived stress on depression is not constant, but varies, across levels of social support.

The results of the R^2 increment analysis for the second buffering hypothesis are presented in Table 3. Four separate measures of perceived stress (lack of variety, role conflict, pressure at work, and problem with pressure) and six separate measures of social support (perceived support from supervisor, coworker, spouse, friend, and relative and spouse present/absent) were used as independent variables. The dependent variable, depression, was estimated using one perceived stress measure, one social support measure, and one perceived stress x support interaction term. In total, 24 equations were estimated to assess the effects of social support, perceived stress, and the significance of the social support x perceived stress interaction term.

Table 3 reveals that 11 out the 24 interaction terms tested reached significance ($p<.10$) using the *F* test. This indicates that the interaction between perceived stress and social support was able to explain variance in the dependent variable over and above the variance explained by social support and perceived stress in 46 per cent of the equations tested. In general, nonwork-related sources of support were found to interact with perceived stress more than work-related sources of support. Seventy-three per cent of the significant interaction terms involved nonwork-related sources of support (spouse, friend, relative) while the remainder, 27 per cent, involved work-related support sources (supervisor, coworker). Spouse support, which interacted with every one of the four measures of perceived

Table 3. Multiple Correlation Coefficients for Regressions of Depression on Perceived Stress, Support, and Perceived Stress x Support

Dependent Variable	Independent Stress Variable	Independent Support Variable	Main Effect Equation[1] R_1^2	Main Effect Equation With Interaction Term[2] R_2^2	F_{change}[3]
Depression	Variety	Supervisor	.10	.10	.01
		Coworker	.07	.08	3.64*
		Spouse	.12	.15	8.73**
		Friend	.07	.07	.00
		Relative	.07	.07	.23
		Spouse pres/absent	.08	.08	.05
Depression	Role conflict	Supervisor	.18	.18	3.61*
		Coworker	.17	.17	.89
		Spouse	.19	.22	9.58**
		Friend	.16	.17	2.92*
		Relative	.16	.16	2.63*
		Spouse pres/absent	.17	.17	.55
Depression	Pressure at Work	Supervisor	.21	.22	1.69
		Coworker	.21	.21	1.03
		Spouse	.22	.24	6.73**
		Friend	.20	.20	3.50*
		Relative	.20	.20	1.30
		Spouse pres/absent	.20	.20	.38
Depression	Problem with Pressure	Supervisor	.25	.26	6.49**
		Coworker	.25	.25	.23
		Spouse	.27	.28	5.42**
		Friend	.24	.24	1.31
		Relative	.25	.25	.09
		Spouse pres/absent	.25	.25	2.35*

**significant at $p<.05$ *significant at $p<.10$

[1] $Y=b_0+b_1$Perceived stress$+b_2$Support

[2] $Y=b_0+b_1$Perceived stress$+b_2$Support$+b_3$Work conditions x Support

[3] $F_{change}=\frac{(R_2^2-R_1^2)/(k_2-k_1)}{(1-R_2^2)/(n-k_2-1)}$ where k is the number of independent terms in the equation. This tests the significance of the perceived stress x support term.

stress, was involved in more significant interactions than any other source of support. Of the perceived stress measures, role confict and problem with pressure were involved in the greatest proportion, 36 per cent and 27 per cent respectively, of the significant interactions with social support.

Overall, a good proportion, almost one half, of the interaction terms tested proved to contribute significantly to the explained variance in depression. The significant interaction terms indicate that the effect of perceived stress on depression and the effect of social support on depression are best described in terms of joint effects. That is, for each significant interaction, the effect of perceived stress on depression is not independent of, but rather is dependent upon, the level of social support. The buffering hypothesis predicts a specific conditional pattern; namely, that as the level of social support increases, the effect of perceived stress on depression will decrease. The specific pattern of interaction displayed by each of the 11 significant interaction terms may or may not be consistent with the pattern predicted by the buffering hypothesis. Therefore, to provide a definitive test of the buffering hypothesis, the pattern of interaction for each of the significant social support x perceived stress terms needs to be specified.

3. Sub-group Analysis

Sub-group regression analysis was used to test whether the particular interactive patterns displayed by the 11 significant interactions in Table 3 were consistent with the buffering hypothesis. For each of the 11 significant interactions, four social support groups were formed; low, medium-low, medium-high, and high. Sub-group analysis involved regressing depression on perceived stress within low, medium-low, medium-high, and high support groups. The buffering hypothesis predicts that the effects of perceived stress on depression will be positive in the low support groups. Furthermore, the strength of the relationship between perceived stress and depression is predicted to decrease as social support increases. This can be restated more specifically; b_1 for the high support group < b_2 for the medium-high support group < b_3 for the medium-low support group < b_4 for the low support group. In no support group is the relationship between perceived stress and depression expected to be significantly less than zero.

Table 4 reports the results of the sub-group analysis for the 11 significant interactions. The interaction of supervisor support with role conflict and with problem with pressure is not compatible with the buffering hypothesis. For both interactions, the relationship between perceived stress and depression is positive in the low supervisor support group. However, the effect of perceived stress on depression does not vary across supervisor support groups in

Table 4. Regression Coefficient Differences in the Regression of Depression on Perceived Stress in Low, Medium-low, Medium-high, and High Support Groups

Dependent Variable	Independent Stress Variable	Support Group	Stress Regression Coefficient Within Each Support Group: low b_1	med-low b_2	med-high b_3	high b_4	Significance Level of Regression Coefficient Differences[1]: $b_1>b_2$	$b_1>b_3$	$b_1>b_4$	$b_2>b_3$	$b_2>b_4$	$b_3>b_4$
Depression	Role Conflict	Supervisor	.14**	.12**	.12**	.25**	.34	.33	--	.50	--	--
	Prob. pressure	Supervisor	.15**	.13**	.14**	.29**	.42	.46	--	--	--	--
	Variety	Coworker	.08	.12**	.13**	.10**	--	--	--	--	.36	.29
	Variety	Spouse	.20**	.21**	.09	.08**	--	.13*	.07*	.10*	.04**	.44
	Role Conflict	Spouse	.26**	.21**	.04	.13**	.33	.02**	.08*	.02**	.12*	--
	Pressure work	Spouse	.24	.25**	.26**	.28**	--	--	--	--	--	--
	Prob. pressure	Spouse	.14*	.25**	.13**	.17**	--	.45	--	.04**	.06*	--
	Role Conflict	Friend	.18**	.18**	.18**	.12**	--	--	.22	--	.10*	.06*
	Pressure work	Friend	.17*	.18**	.33**	.29**	--	--	--	--	--	.25
	Role Conflict	Relative	.16**	.12**	.15**	.17**	.26	.43	--	--	--	--
			Absent (b_1)		Present (b_2)							
	Prob. Pressure	Spouse ab/pr	.13**		.18**		--	na	na	na	na	na

**significant at $p<.05$

*significant at $p<.10$

[1]The significance of the regression coefficient differences between support groups is assessed using a one-tailed Z test where $Z=b_1-b_2/\sqrt{SE^2_{b_1} + SE^2_{b_2}}$.

The Z test is not employed where the direction of the difference between regression coefficients is inconsistent with the predicted pattern. Thus, empty cells designate a directional difference between regression coefficients inconsistent with the predicted direction.

the predicted direction. Contrary to the buffering hypothesis, the relationship between perceived stress and depression is stronger, not weaker, for those workers who have the highest level of supervisor support. In both these interactions, high supervisor support actually appears to exacerbate the effects of role conflict and the effects of problem with pressure on depression.

Table 4 indicates that the interaction of coworker support with lack of variety is also not consistent with the buffering hypothesis. At the lowest level of coworker support, the association between lack of variety and depression is insignificant. Moreover, the relationship between lack of variety and depression does not vary across support groups in the pattern predicted by the buffering hypothesis. Most of the differences between coworker support groups are not in the expected direction. The two contrasts between coworker support groups which are in the expected direction are insignificant.

Continuing with the examination of Table 4, it appears spouse support interacts with lack of variety and with role conflict in a pattern consistent with the buffering hypothesis. Figures 3 and 4 provide a visual representation of these interactions. The effect of lack of variety on depression and the effect of role conflict on depression are positive in the low spouse support groups. Furthermore, it appears that medium-high and high levels of spouse support act to buffer or reduce the effects of role conflict and

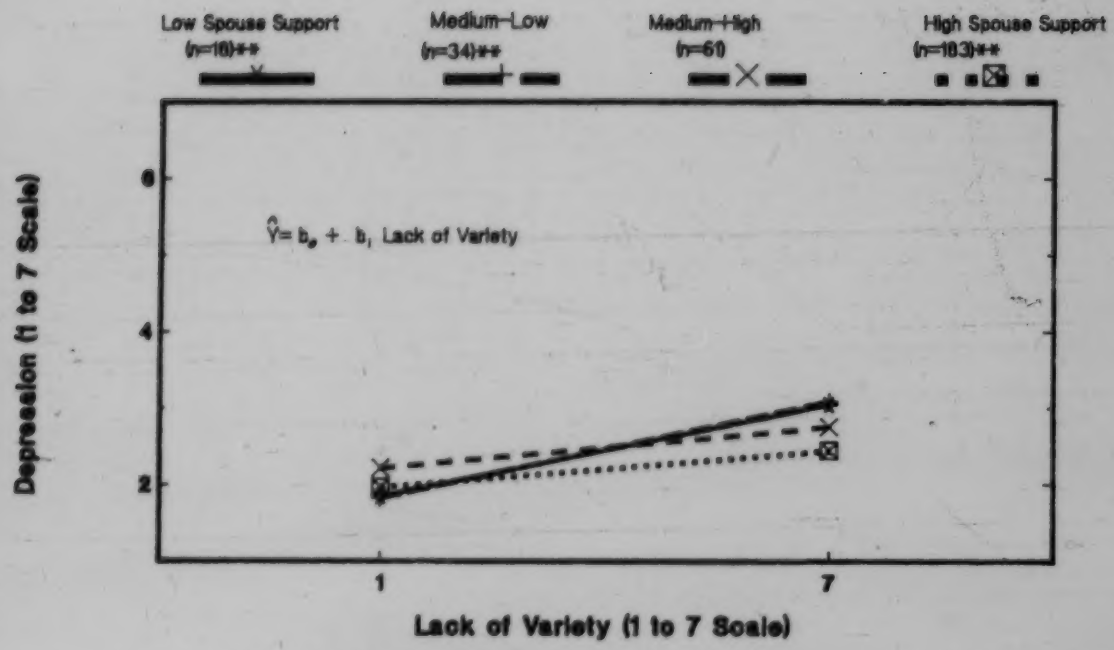

Figure 3. Spouse Support Buffering the Relationship Between Perceived Lack of Variety and Depression

** Significant at $p < .05$

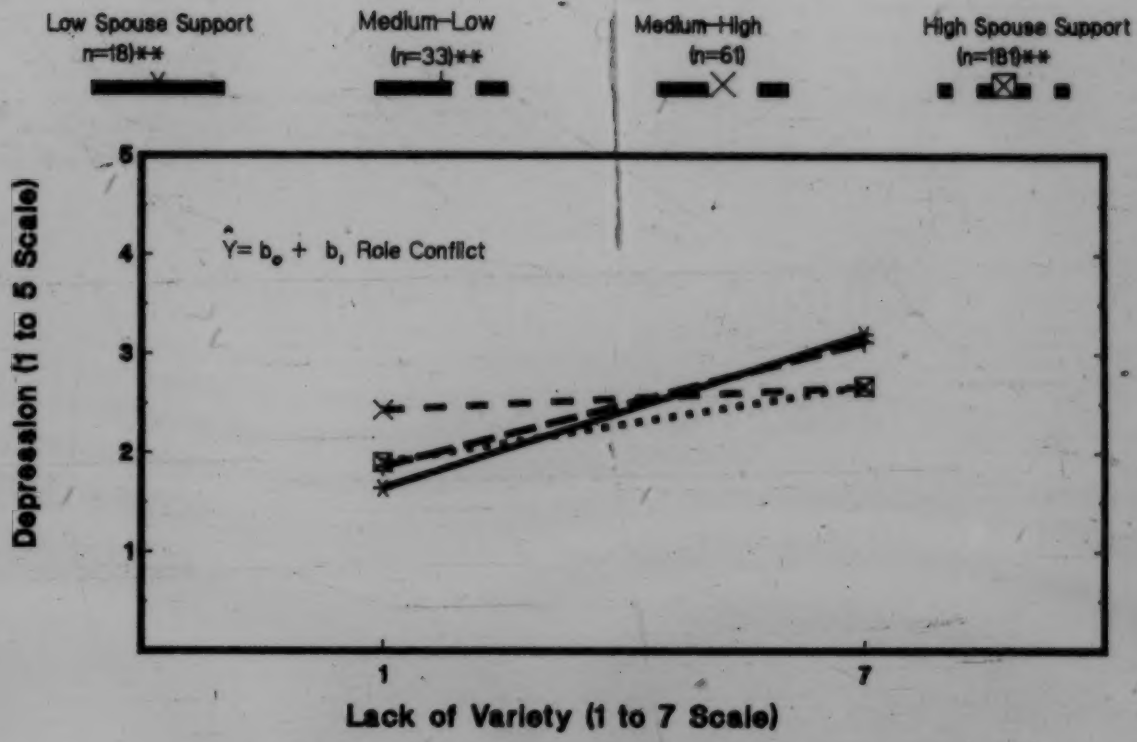

Figure 4. Spouse Support Buffering the Relationship Between Perceived Role Conflict and Depression

** Significant at $p < .05$

lack of variety on depression; in both the medium-high and high spouse support groups, the effect of lack of variety and the effect of role conflict on depression diminishes significantly in comparison to the low and medium-low spouse support groups.

Table 4 shows that the interaction between spouse support and pressure at work is not compatible with the buffering hypothesis. None of the differences between support groups in the effects of pressure at work on depression are in the predicted direction for this interaction. The interaction of spouse support and problem with pressure, however, appears to be partially consistent with the buffering hypothesis. This interaction is displayed in Figure 5. The contrast of the medium-low spouse support group with the medium-high and high spouse support groups is consistent with the buffering hypothesis. Those workers who have medium-high or high levels of spouse support suffer significantly less from the impact of problem with pressure than those workers who have medium-low levels of spouse support. Curiously, however, the relationship between problem with pressure and depression is comparatively weak for those workers who have the lowest level of spouse support. It should be noted that the estimated coefficient for the low spouse support group may be unreliable given the small sample size (n=19) of this group.

Looking again at Table 4, it appears that the interaction of friend support and role conflict is also

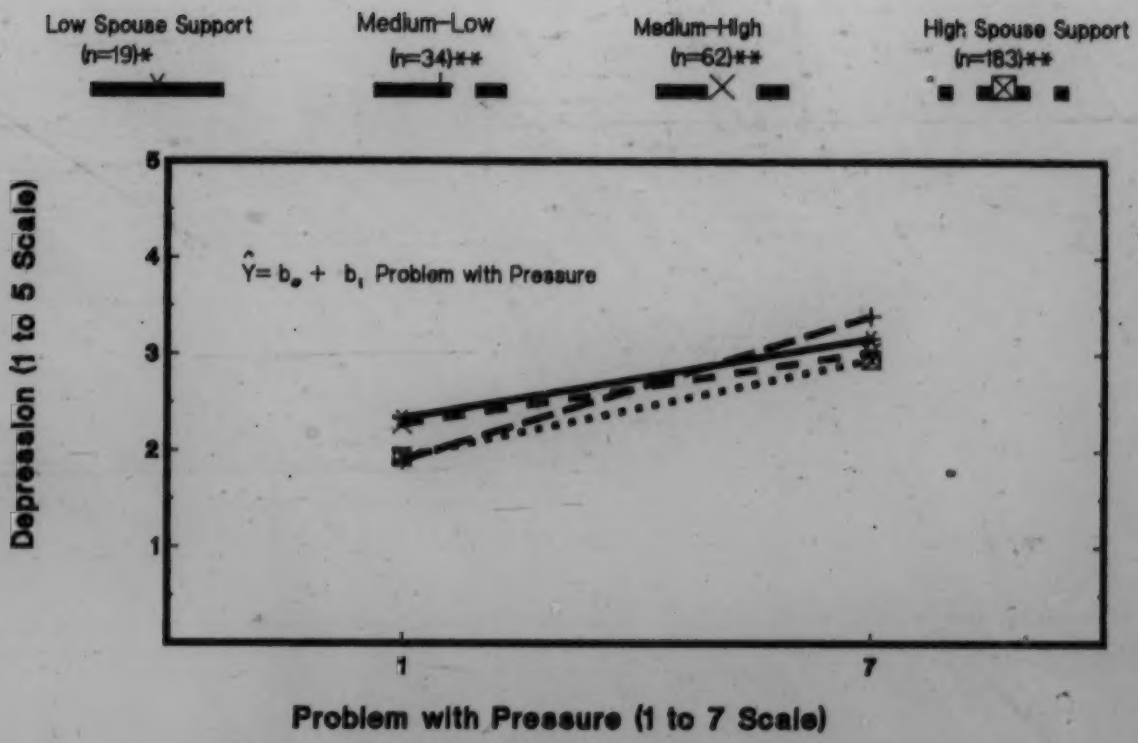

Figure 5. Spouse Support Buffering the Relationship Between Perceived Problem with Pressure and Depression

* Significant at $p < .10$ ** Significant at $p < .05$

partly consistent with the buffering hypothesis. Figure 6 presents this interaction. Although there are no differences in the effect of role conflict on depression between low, medium-low, and medium-high friend support groups, the effect of role conflict on depression does decrease significantly for those workers who have the highest level of friend support. In this case, a high level of friend support appears to weaken or buffer the relationship between role conflict and depression.

None of the remaining interactions in Table 4 are consistent with the buffering hypothesis. The interaction of friend support and pressure at work displays only one support group difference in the predicted direction and this difference is not significant. As well, neither the interaction of relative support with role conflict or the interaction of spouse absent/present with problem with pressure exhibit a pattern of differences between support groups compatible with the buffering hypothesis. Both of these interactions show only a few, and insignificant, differences between support groups.

4. Summary of Results

The R^2 increment analysis revealed that a fairly large proportion, 46 per cent, of the social support x perceived stress interaction terms tested were able to contribute significantly to the explained variance in depression. Overall, nonwork-related sources of support were found to

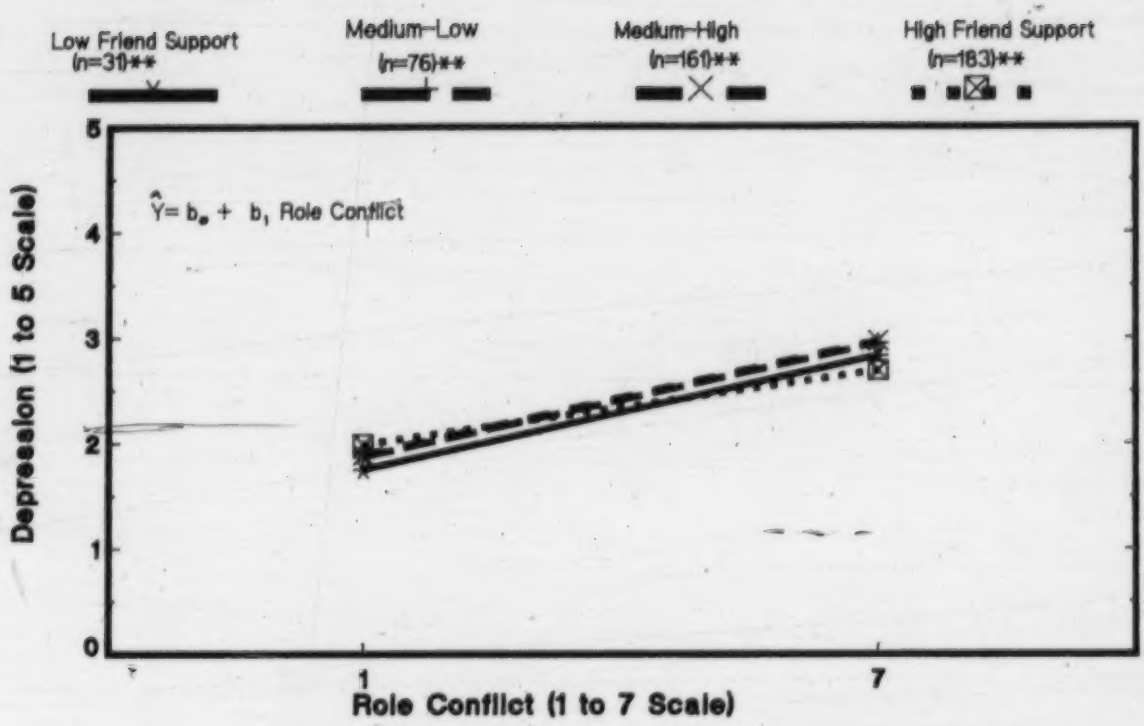

Figure 6. Friend Support Buffering the Relationship Between Perceived Role Conflict and Depression

** Significant at $p < .05$

interact with perceived stress more than work-related sources of support. Seventy-three per cent of the significant perceived stress x social support interactions involved nonwork-related sources of support (spouse, friend, relative). Spouse support, in particular, was found to interact with perceived stress more than any other source of support. With respect to the perceived stress measures, role conflict and problem with pressure were involved in the greatest proportion, 36 per cent and 27 per cent respectively, of the significant interactions with social support.

Sub-group regression analysis was used to test whether the significant interaction terms found in the R^2 analysis were consistent with the buffering hypothesis. Sub-group regression analysis revealed that the interaction of spouse support with lack of variety and with role conflict was consistent with the buffering hypothesis. The strength of the relationship between lack of variety and depression and between role conflict and depression was significantly reduced for those workers who had medium-high and high levels of spouse support. In addition, spouse support appeared to buffer, at least partially, the effect of problem with pressure on depression. Again, those workers who have medium-high and high levels of spouse support were found to suffer less from the effects of problem with pressure than those workers who have medium-low levels of support. This interaction was somewhat inconsistent with the

buffering hypothesis in that the lowest spouse support group showed a comparatively weak relationship between problem with pressure and depression.

The interaction of friend support with role conflict was also found to be partly consistent with the buffering hypothesis. Those workers in the high friend support group were found to suffer less from the impact of role conflict than those workers who had lower levels of friend support. This interaction did not entirely conform with the pattern of interaction predicted by the buffering hypothesis in that there were no significant differences found in the effects of role conflict between low, medium-low, and medium-high friend support groups.

Overall, the sub-group analysis provides some support for the hypothesis that social support buffers the impact of perceived stress on depression. In total, four out of 24 or 17 per cent, of the social support x perceived stress interaction terms tested were consistent with the buffering hypothesis. Spouse support accounted for almost all of the observed buffering effects; spouse support was involved in three out of the four buffering interactions reported and therefore, appears to be a consistent stress buffer. Among married workers (it will be remembered that spouse support excludes non-married workers), medium-high and high levels of spouse support were found to significantly weaken or reduce the effects of perceived stress on depression. No other source of support was found to consistently buffer the

impact of perceived stress on depression. Thus, the ability of social support to moderate the effects of perceived stress on depression appears to be specific to spouse support.

It is important to recognize further that the statistically significant buffering effects displayed by spouse support may be of questionable practical significance. The largest reduction in the relationship between perceived stress and depression is observed in the interaction of spouse support with role conflict. Table 3 indicates that the spouse support x role conflict interaction term is able to increase the explained variance in depression only by three per cent over and above the variance explained by spouse support and role conflict alone. More specifically, Table 4 reveals that for those workers at the lowest level of spouse support, an increase in role conflict of one unit predicts a 0.26 increase in depression. In contrast, for those workers with medium-high levels of spouse support, the effect of role conflict on depression reduces to zero. Thus, workers who have medium-high levels of spouse support are completely buffered from the effects of role conflict on depression. This complete buffering effect represents a reduction in the impact of role conflict of only one quarter of one point on a five point depression scale. Spouse buffering effects of such small magnitudes may represent limited practical or applied utility.

V. DISCUSSION AND CONCLUSIONS

A. REVIEW OF RESULTS

The first buffering hypothesis tested proposed that the effect of adverse work conditions on perceived stress is buffered by social support. That is, it was predicted that workers subject to adverse work conditions who have high levels of social support would be less likely to perceive stress than those workers who have low levels of social support. Data analysis failed to provide evidence for this hypothesis. Of the 24 tests conducted, only one displayed a conditional pattern across social support groups consistent with the buffering hypothesis. This one consistent finding out of a total of 24 tests is clearly not more than would be expected by chance alone.

The second buffering hypothesis tested proposed that social support moderated or buffered the effects of perceived stress on depression. This hypothesis predicted that workers who have high levels of social support would be less likely to suffer from the effects of perceived stress than those workers with low levels of social support. The data analysis provided limited support for this hypothesis. In total, 17 per cent (four out of 24) of the social support x perceived stress interaction terms tested were consistent with the buffering hypothesis. Spouse support was involved in three out of the four buffering interactions reported and hence accounted for almost all of the observed buffering

effects. The data analysis thus suggests that the ability of social support to moderate the effects of perceived stress on depression is specific to spouse support.

B. DISCUSSION

The one notable finding in this study is that spouse support buffers the relationship between perceived stress and depression. The relationship between perceived stress and depression was weaker for female workers who reported a high degree of spouse support compared to those who reported a low degree of spouse support. This is consistent with the Etzion (1984) study which found that home support was an important occupational stress buffer for women. It has been argued that working women are often subject to a dual work load. In addition to fulfilling a full-time employment role, many women are responsible for the majority of household chores and childcare tasks. This has been identified as a primary source of stress and as a possible explanation for the higher rate of reported depression among females (Gore and Mangione, 1983; Aneshensel et al., 1981; Gove and Geerken, 1977). Spouse support, therefore, appears to represent a particularly critical source of support for working women. Working women who receive little in the way of instrumental and/or emotional support from their spouses may be particularly vulnerable to the ill effects of perceived occupational stress. This may account for the pervasive ability of spouse support to buffer the effect of

perceived occupational stress on depression observed in this study.

The small magnitude of spouse support buffering effects needs to be recognized. The interaction of perceived stress with spouse support accounts for no more than three per cent of the explained variance in depression. Spouse buffering effects of such a small size may indicate limited practical or applied significance. It is possible, however, that the size of effect has been underestimated due to weaknesses in methodology. As noted earlier, unreliablity in the measurement of the social support variable and the cross-sectional research design may operate to attenuate the estimated size of effect.

Weaknesses in methodology may represent part of the reason why the majority of tests for interaction effects in the data analysis failed to substantiate the buffering hypothesis. The strength of the research framework determines to a large extent the confidence that can be attached to the results as reflecting the true state of affairs in the population. It may be that social support does operate to buffer the effects of both work conditions and perceived stress but that the study has failed to detect this due to weaknesses in study methods. In particular, the cross-sectional survey design and the measurement of the social support variable, may represent two weaknesses which threaten the validity of the results obtained in this study.

1. Cross-sectional Survey Design

Cross-sectional survey designs which take "snap shots of persons and their circumstances" at one point in time may miss that dynamic process by which adaptation to stress occurs (Payne et al., 1982:139). Failure to detect stress buffering effects in this study may be due to the inappropriate timing of the measurement of the independent and dependent variables in the conditional relationship. For example, the measurement of perceived stress after the buffering effects of social support have occurred may act to obscure a true conditioning relationship.

2. Measurement

The methodology section in Chapter Three identified numerous weaknesses in measurement. Deficiencies in the measurement of the social support variable represents, perhaps, the greatest threat to the adequacy of tests for stress buffering effects in this study. It will be recalled that each of the five sources of social support considered in this study is measured on the basis of a four point response item. Measurement of a complex phenomenon like social support on the basis of a single item increases the probability of chance error or random response which, in turn, decreases the likelihood that the observed score on a given item reflects the respondents' true score. In addition, the four point response scale used to measure each source of social support may not accurately capture the full

range of response. Overall, these weaknesses reduce confidence in the reliability of the social support measurement.

The measurement of social support, perceived stress, and depression in this study may, to some extent, reflect qualities other than the supposed theoretical constructs. Cross-sectional surveys are particularly open to the criticism that the measurement of variables represents, at least in part, common method variance and a response consistency set. Related to this, some researchers have suggested that the observed correlations between reported health outcomes, perceived social support, and perceived stress, may be spurious reflections of an underlying personality disposition, such as negative affectivity (Brief and Atieh, 1987:122). Individuals high in negative affectivity have a pervasive tendency to view themselves, others, and the world in negative terms. As a result, those individuals high in negative affectivity may be more likely to view their spouses as unsupportive, their jobs as stressful, and themselves as depressed. A response pattern like this lends spurious support to the buffering hypothesis.

It is unlikely that the spouse buffering effects observed in this study can be wholly accounted for in terms of an underlying personality disposition such as negative affectivity. No sources of support other than spouse support were found to consistently buffer the relationship between

perceived stress and depression. One would expect that a personality disposition like negative affectivity would act to bias perceptions of support across all sources, not just spouse support. Consequently, if it is argued that the buffering effect observed for spouse support is an artifact of a personality disposition like negative affectivity, then it becomes difficult to account for the observation that no other source of support was similarly biased (i.e., that no other sources of support exhibited buffering effects).

C. SUGGESTIONS FOR FUTURE RESEARCH

An adequate understanding of the stress process and the ways in which social support may intervene in this process requires theoretical refinement, improvements in methodology, and an expansion of research effort. The present study has served to highlight, either implicitly or explicitly, some of the areas in need of attention in stress buffering research. These are:

1. Additive and Interactive Stress Buffering

More attention needs to be paid to the additive stress buffering model. Only a few researchers have recognized the additive stress buffering model. In part, this may be due to the fact that it is perceived support, rather than actual support resources that is measured in cross-sectional surveys. Consideration of the circumstances where additive and/or interactive stress buffering may apply needs to be

addressed both theoretically and empirically.

2. Perceived Support and Actual Support

More needs to be known about the relationship between perceived support and actual support. The mechanisms by which actual support leads to perceptions of support has not been delineated. A related issue is whether perceived support intervenes directly in the stress process by influencing event appraisal or whether perceived support intervenes indirectly through actual support received. Wethington and Kessler (1986) report that perceived support, rather than received support, may represent the critical buffering variable in the stress process. The relative importance of perceived support and received support may be dependent upon the nature of the stressful event and the specific stress buffering (additive or interactive) model. More research will be needed to clarify these issues.

3. Objective Job Conditions and Perceived Job Conditions

Scant attention has been paid to the role of objective job conditions in the stress process. Very little is known concerning the translation of objective job conditions into perceptions of stress and the role that social support may play in this process. Research needs to be specifically focused on the ability of social support to affect the perceptions of stress in the work environment. Observational research and indepth interviews will be required to

accomplish this task.

Another reason for grounding measures of perceived stress in the objective environment is that it will permit a better estimation of the parameters in the stress process. Measures of perceived stress which are grounded with objective measures will allow an estimation of the degree of reciprocal causation between perceived stress and measures of perceived distress (Kessler, 1983:313).

4. Structured and Unstructured Measurement

Brief and Atieh (1987:122) rightly suggest that "rather than assuming researchers' *a priori* labels of job conditions as stressful are plausible, there is a need to examine how workers themselves label the conditions of their work." Indepth interviews exploring the stress process, along with the inclusion of open ended questions in survey data, would serve to stimulate new ideas and might help to capture some of the complexities involved in the stress process.

5. Personality Variables

Much of the research on stress buffering is open to the criticism that a stable personality disposition may account for some, if not all, of the observed correlation between key variables. The measurement of personality characteristics most likely to contaminate stress buffering effects, such as negative affectivity and sociability, would help to control and rule out this sort of rival explanation.

6. Panel Study

Almost all researchers have emphasized the importance of a prospective study to capture the complex process of stress over time. A prospective panel design would allow for a sensitive analysis of the specific dynamics of social support intervention in the stress process.

D. CONCLUSIONS

This study has provided little support for the hypothesis that social support buffers the relationship between objective job conditions and perceived occupational stress. Limited support has been found for the hypothesis that social support buffers the relationship between perceived stress and depression. Spouse support was observed to consistently mitigate or reduce the effect of perceived stress on depression. Supervisor, coworker, friend, and relative support were not found to be significant stress buffers of either objective work conditions or perceived stress.

Generally, there appear to be two possible reasons that explain why the data analysis would, to a large extent, fail to confirm the buffering hypothesis. First of all, it may be that the buffering effect of social support, with the possible exception of spouse support, does not exist in the population. That is, social support may not operate to buffer the occupational stress process among female workers. Second of all, it may be that buffering effects exist, but

that the study has failed to detect this because of methodological shortcomings. Cross-sectional survey data and weaknesses in measurement - most notably in the measurement of the social support variable - may act to obscure true conditioning effects.

Given weaknesses in study design, the failure to detect stress buffering effects in this study must be interpreted with caution. Other empirical work and everyday experience strongly suggests that social support does, indeed, play an important moderating role in the stress process. Empirical work in the area of social psychology reveals that interaction with others influences both the perceptions of events and the perceived importance of events (House and Wells, 1978:12). As well, everyday experience highlights the significance of supportive ties with others in times of crisis or enduring hardship. Thus, it seems plausible that the failure to observe stress buffering effects in this study reflects weaknesses in study design, rather than the true state of affairs in the population.

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Appendix A

Means and Standard Deviations for the Study Variables

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Means and Standard Deviations for the Study Variables

	Mean	Standard Deviation
1. Supervisor Support	2.28	.951
2. Coworker Support	2.75	.834
3. Spouse Support	3.37	.921
4. Friend Support	3.09	.924
5. Relative Support	2.85	1.109
6. Role Conflict	4.56	1.501
7. Lack of Variety	4.97	1.360
8. Problem of Pressure	3.55	1.705
9. Pressure at Work	3.16	.909
10. Depression	2.47	.560
11. Work Conditions[1]	1.62	.484

[1]Work Conditions coded 1=outside worker 2=inside worker

Appendix B

Zero Order Correlations for the Study Variables

Appendix B

Zero Order Correlations for the Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Supervisor Support	1.00										
2. Coworker Support	.167**	1.00									
3. Spouse Support	.031	.207**	1.00								
4. Friend Support	.065	.362**	.509**	1.00							
5. Relative Support	.069	.236**	.474**	.506**	1.00						
6. Role Conflict	-.227**	.046	-.117**	-.047	-.019	1.00					
7. Lack of Variety	-.293**	-.059	.020	.004	.004	.141**	1.00				
8. Problem of Pressure	-.266**	-.054	-.102**	-.018	.039	.512**	.155**	1.00			
9. Pressure at Work	-.226**	-.020	-.159**	-.076	-.021	.486**	.123**	.777**	1.00		
10. Depression	-.231**	-.110**	-.234**	-.069	-.054	.403**	.267**	.495**	.448**	1.00	
11. Work Conditions'	-.221**	.039	-.014	.025	-.050	.148**	.212**	.144**	.117**	.182**	1.00

**significant at $p<.05$

'Work Conditions coded 1=outside worker 2=inside worker